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Test of Motor Ability for College Men¹

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Wake Forest College
Wake Forest, North Carolina

Abstract

The purpose of this study was to develop an easily administered test of motor ability for college men. Expert opinion was used in the validation process and eight factors of motor ability and 29 items measuring those factors were chosen. The selected tests were administered to 222 college men and statistical analysis covered item reliability, objectivity, correlations with the criterion, and intercorrelations. Through use of the Doolittle technique multiple correlations and regression equations were computed for a number of combinations. Two test batteries including one short indoor test were recommended. Scoring tables, norms, score card, profile, and directions for administering are included in a test manual.

THERE IS A NEED in physical education today for an evaluation of the college student's ability in motor learning and performance. In the area of motor ability particularly there is a need for a valid, reliable, objective, and usable test for college men. Such a test should be suited to the uses of classification and guidance. There should be an opportunity for practice of the fundamental skills and there should be sufficient interest to motivate the student to maximum effort. Also, the test should contribute to the experiences which a student has already had and should aid materially in his development.

In physical education, proper placement and scheduling of students in basic classes is necessary if individual needs are to be met. Social development is more likely to occur when individuals and groups are equated in powers and abilities. It is also a valuable adjunct for a program to diagnose individual weaknesses so that prescription of activity may be made. When these things are done, the effectiveness of teaching is materially increased. When classification, motivation, and teaching efficiency criteria are met, colleges may have gone far in reducing the poor student attitude which has characterized college physical education programs in the past. Few college programs challenge the superior student in physical education any more than they provide adequately for the needs of the physical morons. Educators need to know as much concerning the student's ability to perform skills as his ability to do academic work if the student's "whole" needs are to be met.

Purpose of the Study

The purpose of this study was an attempt to develop an easily administered test of general motor ability for college men. The test could be used for purposes of classification, guidance, and measurement of achievement. The battery should be based on an acceptable criterion of motor ability and

¹This study was made in partial fulfillment of the requirements for the degree of Doctor of Physical Education in the School of Health, Physical Education, and Recreation, Indiana University, 1953.

through the correlation technique, it should be possible to: (a) discover the objectivity and reliability of individual test items; (b) determine the validity of the test battery; (c) develop regression equations of high validity for the prediction of motor ability; and (d) develop norms for such test batteries as may be devised.

Selection of the Criterion

In the validation process it seemed logical to make use of the screening which had already been done in the area of motor ability. First, an analysis of a number of recognized tests of motor performance (1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17) was made in order to determine what test items had been found to be the most valid measures of motor ability as shown by their use in these varied test batteries. A total of 87 items which had been used to measure 15 different factors of motor ability was found. Through use of the jury technique, the following information was obtained: (a) the factors which are most highly related to motor ability, (b) the items which are primary measures of these factors, and (c) the items which have secondary relationship with the factors. On the basis of the findings from the data obtained from the jury, eight factors were selected as the factors most highly related to motor ability. These factors were: agility, hand-eye-foot-eye coordination, speed, power, arm and shoulder coordination, strength, balance, and flexibility.

A composite score from a number of selected test items serves as an acceptable criterion in studies of this type. The final criterion was selected largely from the 87 items mentioned above. The battery was selected on the basis of the following criteria: (a) a high rating by the jury as a primary measure of a factor, (b) a high rating as both a primary and secondary measure of factors of motor ability (this was done in order to get as broad a relationship with motor ability as possible), (c) logical appraisal on the basis of selected evaluative criteria, and (d) measurement on a continuum as distinguished from the pass-or-fail-type item.

The following 29 items were selected for the final criterion and are listed with the expected primary contribution of factors: AGILITY—bar snap, zig-zag run, bar vault, low hurdles, squat thrust, turn jump, criss cross, and side step; HAND—EYE—FOOT—EYE CO-ORDINATION—ball toss, wall pass, baskets per minute, and football punt; SPEED—60-yard dash, shuttle run, and obstacle run; POWER—vertical jump, high jump, and standing broad jump; ARM AND SHOULDER CO-ORDINATION—basketball throw and softball throw; STRENGTH—push ups, straddle chins, medicine ball put, and shot put; BALANCE—foot and toe balance, stork stand, and frog stand; FLEXIBILITY—trunk flexion and trunk extension.

This criterion may logically be assumed to measure motor ability, since it is a result of the screening of other recognized tests of motor ability, since it is represented by a wide range of factors each measured by a fair sampling of items, and since both factors and items were selected by experts in the

field of physical education. The judgment of the jury with respect to the factors and the items was substantiated by the findings.

Procedure

The 29 items were administered on a test-retest basis to 222 male students enrolled in the Freshman basic physical education classes at Wake Forest College. The data collected were *T*-scored for each item and by summing the 29 *T*-scores for each subject a composite criterion score was obtained for each subject. These composite scores were then *T*-scored. The next step was the calculation of the intercorrelations of all items and the correlations of all items with the criterion. The correlations and intercorrelations were placed in a correlation matrix.

The raw scores on successive administrations of the same test were used to obtain the reliability of each test item. Raw scores obtained by two scorers on the first administration of the tests were used to obtain the objectivity for each test item.

The correlation matrix was used as a basis for the development of multiple regression equations for the prediction of general motor ability. A number of combinations of items were selected based on the principles of high correlation with the criterion and low correlation with each other, and a desire of the investigator to have as many of the original eight factors represented directly in the final test battery as possible. Through use of the Doolittle work sheet (7), the Beta weights and percentage of contribution for each item were found for each selected combination. The percentages of contribution were summed for each combination and the proportion of total variance of motor ability, as measured by the 29-item criterion which may be attributed to the combined action of the selected predicting items, was found. The square root of this value became the multiple correlation or multiple *R*, which is the coefficient of correlation between the criterion test and scores of the same test predicted from the regression equations. This multiple *R* gave a basis for comparing the various combination batteries. The next step was the development of regression equations for the prediction of motor ability. Such equations were presented in deviation, raw, and standard score forms for the selected combinations.

Findings

TEST BATTERIES

Two test batteries were recommended for the prediction of general motor ability for college men.

Test Number One (Six Item). The first test was a six-item battery which gave representation to the six most highly related factors² of motor ability. The factor to which each item was assigned by the jury and respective item objectivity, reliability, and correlation with the criterion are shown as follows:

²No item measuring the factors of balance or flexibility had sufficiently high correlation with the criterion to be included in the final battery.

TABLE I
Scoring Tables for the Barrow General Motor Ability Test for College Men (Numbers One and Two)

| Standing Broad Jump (Weight-2.2) | | | Spartan Throw (Weight-1.6) | | | 216 Yag Run (Weight-1.6) | | | Wall Pass (Weight-1.3) | | | Medicine Ball Put (Weight-1.3) | | | 40 Yard Dash (Weight-1.0) | | |
|-------------------------------------|---------------|------|-------------------------------|-------|------|------------------------------|-------|------|---------------------------|-------|------|-----------------------------------|-------|------|------------------------------|-------|------|
| Raw Score T- (inches) | Wtd. Score | Wtd. | Raw Score T- (feet) | Score | Wtd. | Raw Score T- (10th. Sec.) | Score | Wtd. | Raw Score T- (feet) | Score | Wtd. | Raw Score T- (10th. Sec.) | Score | Wtd. | Raw Score T- (10th. Sec.) | Score | Wtd. |
| 100 | 220 | 100 | 386-389 | 100 | 160 | 17.5 | 100 | 160 | 100 | 100 | 100 | 72 | 100 | 120 | 100 | 100 | 100 |
| 99 | 218 | 99 | 392-395 | 99 | 159 | 17.6 | 99 | 158 | 99 | 99 | 99 | 71.5 | 99 | 119 | 99 | 99 | 99 |
| 98 | 216 | 98 | 378-381 | 98 | 157 | 17.7-17.8 | 97 | 155 | 98 | 127 | 98 | 70.5-71 | 98 | 118 | 98 | 98 | 98 |
| 97 | 213 | 97 | 374-377 | 97 | 155 | 17.9 | 97 | 155 | 26 | 127 | 97 | 70 | 97 | 116 | 97 | 97 | 97 |
| 96 | 211 | 96 | 370-373 | 96 | 154 | 18.0-18.1 | 96 | 154 | 96 | 127 | 96 | 69.5 | 96 | 115 | 96 | 96 | 96 |
| 95 | 209 | 95 | 366-369 | 95 | 152 | 18.2 | 95 | 152 | 95 | 127 | 95 | 69 | 95 | 114 | 95 | 95 | 95 |
| 94 | 207 | 94 | 362-365 | 94 | 150 | 18.3-18.4 | 94 | 150 | 94 | 121 | 94 | 68-68.5 | 94 | 113 | 94 | 94 | 94 |
| 93 | 205 | 93 | 358-361 | 93 | 149 | 18.5 | 93 | 149 | 25 | 121 | 93 | 67.5 | 93 | 112 | 93 | 93 | 93 |
| 92 | 202 | 92 | 354-357 | 92 | 147 | 18.6-18.7 | 92 | 147 | 92 | 121 | 92 | 67 | 92 | 110 | 92 | 92 | 92 |
| 91 | 200 | 91 | 350-353 | 91 | 146 | 18.8 | 91 | 146 | 91 | 116 | 91 | 66.5 | 91 | 109 | 91 | 91 | 91 |
| 90 | 198 | 90 | 346-349 | 90 | 144 | 18.9-19.0 | 90 | 144 | 24 | 116 | 90 | 65.5-66 | 90 | 108 | 90 | 90 | 90 |
| 89 | 196 | 89 | 342-345 | 89 | 142 | 19.1 | 89 | 142 | 90 | 116 | 89 | 65 | 89 | 107 | 89 | 89 | 89 |
| 88 | 194 | 88 | 338-341 | 88 | 141 | 19.2-19.3 | 88 | 141 | 88 | 116 | 88 | 64.5 | 88 | 105 | 88 | 88 | 88 |
| 87 | 191 | 87 | 334-337 | 87 | 139 | 19.4 | 87 | 139 | 87 | 116 | 87 | 64 | 87 | 104 | 87 | 87 | 87 |
| 86 | 189 | 86 | 330-333 | 86 | 138 | 19.5-19.6 | 86 | 138 | 86 | 116 | 86 | 63-63.5 | 86 | 103 | 86 | 86 | 86 |
| 85 | 187 | 85 | 326-329 | 85 | 136 | 19.7 | 85 | 136 | 85 | 116 | 85 | 62.5 | 85 | 102 | 85 | 85 | 85 |
| 84 | 185 | 84 | 322-325 | 84 | 134 | 19.8-19.9 | 84 | 134 | 23 | 106 | 84 | 62 | 84 | 101 | 84 | 84 | 84 |
| 83 | 183 | 83 | 318-321 | 83 | 133 | 20.0-20.1 | 83 | 133 | 23 | 106 | 83 | 61.5 | 83 | 100 | 83 | 83 | 83 |
| 82 | 180 | 82 | 314-317 | 82 | 131 | 20.2 | 82 | 131 | 82 | 106 | 82 | 60.5-61 | 82 | 98 | 82 | 82 | 82 |
| 81 | 178 | 81 | 310-313 | 81 | 130 | 20.3-20.4 | 81 | 130 | 81 | 104 | 81 | 60 | 81 | 97 | 81 | 81 | 81 |
| 80 | 176 | 80 | 307-310 | 80 | 128 | 20.5 | 80 | 128 | 22 | 104 | 80 | 59.5 | 80 | 96 | 80 | 80 | 80 |
| 79 | 174 | 79 | 303-306 | 79 | 126 | 20.6-20.7 | 79 | 126 | 79 | 104 | 79 | 59 | 79 | 95 | 79 | 79 | 79 |
| 78 | 172 | 78 | 299-302 | 78 | 125 | 20.8-20.9 | 78 | 125 | 78 | 104 | 78 | 58-58.5 | 78 | 94 | 78 | 78 | 78 |
| 77 | 169 | 77 | 295-298 | 77 | 123 | 21.0 | 77 | 123 | 77 | 99 | 77 | 57.5 | 77 | 92 | 77 | 77 | 77 |
| 76 | 167 | 76 | 291-294 | 76 | 122 | 21.1-21.2 | 76 | 122 | 21 | 99 | 76 | 57 | 76 | 91 | 76 | 76 | 76 |
| 75 | 165 | 75 | 287-290 | 75 | 120 | 21.3 | 75 | 120 | 21 | 99 | 75 | 56-56.5 | 75 | 90 | 75 | 75 | 75 |
| 74 | 163 | 74 | 283-286 | 74 | 118 | 21.4-21.5 | 74 | 118 | 74 | 99 | 74 | 55.5 | 74 | 89 | 74 | 74 | 74 |
| 73 | 161 | 73 | 279-282 | 73 | 117 | 21.6 | 73 | 117 | 73 | 99 | 73 | 55 | 73 | 88 | 73 | 73 | 73 |
| 72 | 159 | 72 | 275-278 | 72 | 115 | 21.7-21.8 | 72 | 115 | 72 | 92 | 72 | 54.5 | 72 | 86 | 72 | 72 | 72 |
| 71 | 156 | 71 | 271-274 | 71 | 114 | 21.9 | 71 | 114 | 20 | 92 | 71 | 53.5-54 | 71 | 85 | 71 | 71 | 71 |
| 70 | 154 | 70 | 267-270 | 70 | 112 | 22.0-22.1 | 70 | 112 | 20 | 92 | 70 | 53 | 70 | 84 | 70 | 70 | 70 |
| 69 | 152 | 69 | 263-266 | 69 | 110 | 22.2 | 69 | 110 | 69 | 92 | 69 | 52.5 | 69 | 83 | 69 | 69 | 69 |
| 68 | 150 | 68 | 259-262 | 68 | 109 | 22.3-22.4 | 68 | 109 | 68 | 87 | 68 | 51.5-52 | 68 | 82 | 68 | 68 | 68 |
| 67 | 147 | 67 | 255-258 | 67 | 107 | 22.5-22.6 | 67 | 107 | 19 | 87 | 67 | 51 | 67 | 80 | 67 | 67 | 67 |
| 66 | 145 | 66 | 251-254 | 66 | 106 | 22.7 | 66 | 106 | 66 | 87 | 66 | 50.5 | 66 | 79 | 66 | 66 | 66 |
| 65 | 143 | 65 | 247-250 | 65 | 104 | 22.8-22.9 | 65 | 104 | 65 | 87 | 65 | 50 | 65 | 78 | 65 | 65 | 65 |
| 64 | 140 | 64 | 243-246 | 64 | 102 | 23.0 | 64 | 102 | 64 | 82 | 64 | 49-49.5 | 64 | 77 | 64 | 64 | 64 |
| 63 | 139 | 63 | 240-243 | 63 | 101 | 23.1-23.2 | 63 | 101 | 18 | 82 | 63 | 48.5 | 63 | 76 | 63 | 63 | 63 |
| 62 | 137 | 62 | 236-239 | 62 | 99 | 23.3 | 62 | 99 | 62 | 82 | 62 | 48 | 62 | 74 | 62 | 62 | 62 |
| 61 | 134 | 61 | 232-235 | 61 | 98 | 23.4-23.5 | 61 | 98 | 61 | 82 | 61 | 47-47.5 | 61 | 73 | 61 | 61 | 61 |
| 60 | 132 | 60 | 228-231 | 60 | 96 | 23.6 | 60 | 96 | 60 | 82 | 60 | 46.5 | 60 | 72 | 60 | 60 | 60 |
| 59 | 130 | 59 | 224-227 | 59 | 94 | 23.7-23.8 | 59 | 94 | 60 | 82 | 59 | 46 | 59 | 71 | 59 | 59 | 59 |
| 58 | 128 | 58 | 220-223 | 58 | 92 | 23.9 | 58 | 92 | 17 | 75 | 58 | 45.5 | 58 | 70 | 58 | 58 | 58 |
| 57 | 125 | 57 | 216-219 | 57 | 91 | 24.0-24.1 | 57 | 91 | 17 | 75 | 57 | 44.5-45 | 57 | 68 | 57 | 57 | 57 |
| 56 | 123 | 56 | 212-215 | 56 | 90 | 24.2 | 56 | 90 | 56 | 75 | 56 | 44 | 56 | 67 | 56 | 56 | 56 |

| | | | | | | | | | | | | | | |
|----|----|-----|---------|----|-----------|----|----|----|----|----|-----------|------|----|------|
| 95 | 55 | 121 | 208-211 | 88 | 24.3-24.4 | 55 | 88 | 55 | 88 | 16 | 55 | 43.5 | 66 | 7.4 |
| 94 | 54 | 119 | 204-207 | 85 | 24.7-24.6 | 54 | 85 | 54 | 86 | 55 | 42.5-43 | 65 | 54 | |
| 93 | 53 | 117 | 200-205 | 82 | 25.0-24.9 | 53 | 82 | 53 | 85 | 52 | 41.5 | 53 | 53 | 7.5 |
| 92 | 52 | 115 | 196-199 | 80 | 25.2-25.1 | 52 | 80 | 52 | 82 | 52 | 40.5-41 | 51 | 51 | 7.6 |
| 91 | 51 | 113 | 192-195 | 78 | 25.5-25.4 | 51 | 78 | 51 | 80 | 50 | 39.5 | 49 | 49 | 7.7 |
| 90 | 50 | 111 | 188-191 | 75 | 25.7-25.6 | 49 | 75 | 49 | 77 | 48 | 38.5-39 | 47 | 47 | 7.8 |
| 89 | 49 | 108 | 184-187 | 72 | 26.0-25.9 | 46 | 72 | 46 | 74 | 46 | 37.5 | 46 | 46 | 7.9 |
| 88 | 48 | 106 | 180-183 | 70 | 26.3-26.2 | 44 | 70 | 44 | 72 | 44 | 36.5-36.5 | 44 | 44 | 8.0 |
| 87 | 47 | 103 | 176-179 | 67 | 26.6-26.5 | 42 | 67 | 42 | 69 | 42 | 35.5 | 42 | 42 | 8.1 |
| 86 | 46 | 101 | 172-175 | 64 | 26.9-26.8 | 41 | 64 | 41 | 66 | 41 | 34.5 | 41 | 41 | 8.2 |
| 85 | 45 | 99 | 168-171 | 62 | 27.2-27.1 | 40 | 62 | 40 | 64 | 40 | 33.5-34 | 40 | 40 | 8.3 |
| 84 | 44 | 97 | 164-167 | 60 | 27.5-27.4 | 38 | 60 | 38 | 62 | 38 | 32.5 | 38 | 38 | 8.4 |
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| 81 | 41 | 91 | 152-155 | 53 | 28.4-28.3 | 33 | 53 | 33 | 55 | 33 | 29.5-29.5 | 33 | 33 | 8.7 |
| 80 | 40 | 88 | 148-151 | 51 | 28.7-28.6 | 32 | 51 | 32 | 53 | 32 | 28.5 | 32 | 32 | 8.8 |
| 79 | 39 | 86 | 144-147 | 50 | 29.0-28.9 | 31 | 50 | 31 | 50 | 31 | 27.5 | 31 | 31 | 8.9 |
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| 75 | 35 | 77 | 128-131 | 42 | 30.2-30.1 | 26 | 42 | 26 | 40 | 26 | 23.5 | 26 | 26 | 9.3 |
| 74 | 34 | 75 | 124-127 | 40 | 30.5-30.4 | 25 | 40 | 25 | 38 | 25 | 22.5 | 25 | 25 | 9.4 |
| 73 | 33 | 73 | 120-123 | 38 | 30.8-30.7 | 24 | 38 | 24 | 36 | 24 | 21.5 | 24 | 24 | 9.5 |
| 72 | 32 | 71 | 116-119 | 36 | 31.1-31.0 | 23 | 36 | 23 | 34 | 23 | 20.5 | 23 | 23 | 9.6 |
| 71 | 31 | 68 | 112-115 | 34 | 31.4-31.3 | 22 | 34 | 22 | 32 | 22 | 19.5 | 22 | 22 | 9.7 |
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| 67 | 27 | 60 | 96-99 | 26 | 32.6-32.5 | 18 | 26 | 18 | 24 | 18 | 15.5 | 18 | 18 | |
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| 65 | 25 | 55 | 88-91 | 22 | | 16 | 22 | 16 | 20 | 16 | 13.5 | 16 | 16 | |
| 64 | 24 | 53 | 84-87 | 20 | | 15 | 20 | 15 | 18 | 15 | 12.5 | 15 | 15 | |
| 63 | 23 | 51 | 80-83 | 18 | | 14 | 18 | 14 | 16 | 14 | 11.5 | 14 | 14 | |
| 62 | 22 | 49 | 76-79 | 16 | | 13 | 16 | 13 | 14 | 13 | 10.5-11 | 13 | 13 | |
| 61 | 21 | 47 | 72-75 | 14 | | 12 | 14 | 12 | 12 | 12 | 9.5 | 12 | 12 | |
| 60 | 20 | 45 | 68-71 | 12 | | 11 | 12 | 11 | 11 | 11 | 8.5 | 11 | 11 | |
| 59 | 19 | 43 | 64-67 | 10 | | 10 | 10 | 10 | 10 | 10 | 7.5 | 10 | 10 | |
| 58 | 18 | 41 | 60-63 | 9 | | 9 | 9 | 9 | 9 | 9 | 6.5 | 9 | 9 | |
| 57 | 17 | 38 | 56-59 | 8 | | 8 | 8 | 8 | 8 | 8 | 5.5 | 8 | 8 | |
| 56 | 16 | 35 | 52-55 | 7 | | 7 | 7 | 7 | 7 | 7 | 4.5 | 7 | 7 | |
| 55 | 15 | 33 | 48-51 | 6 | | 6 | 6 | 6 | 6 | 6 | 3.5 | 6 | 6 | |
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| 19 | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |

| Item | Factor | Objectivity | Reliability | Correlation with criterion |
|---------------------|----------------------|-------------|-------------|-------------------------------|
| Standing broad jump | Power | .996 | .895 | .759 |
| Softball throw | Arm-shoulder co-ord. | .997 | .928 | .761 |
| Zigzag run | Agility | .996 | .795 | .736 |
| Wall pass | Hand-eye co-ord. | .950 | .791 | .761 |
| Medicine ball put | Strength | .997 | .893 | .736 |
| 60-yard dash | Speed | .997 | .828 | .723 |

This battery yielded a multiple R of .950 with a standard error of estimate of 3.16 and can predict general motor ability for college men as measured by the 29-item criterion with approximately 70-per-cent improvement over a best guess. The battery is justifiable on the basis of its high validity, the high objectivity and reliability of its individual items, its contribution to test administrative economy, its inherent interest to the student, its safety and physical suitability, and its developmental value for the student. The regression equation in raw score form is:

$X_o = -1.4384$ (zigzag run in tenths of seconds) $+ .2538$ (medicine ball put in feet) $+ .3744$ (standing broad jump in inches) $- 2.7662$ (60-yard dash in tenths of seconds) $+ .0548$ (softball throw in feet) $+ .7638$ (wall pass) $+ 30.1389$.

The regression equation in standard score form is:

$X = .2214$ (zigzag run) $+ .1614$ (medicine ball put) $+ .2982$ (standing broad jump) $+ .1346$ (60-yard dash) $+ .2143$ (softball throw) $+ .1752$ (wall pass).

Test Number Two (Three Item Indoor Battery). An index of three test items for indoor administration was also developed and presented for predicting general motor ability. This recommended battery consisted of the standing broad jump, medicine ball put, and zigzag run. These three items are included in the six-item battery. This indoor battery had a multiple R of .920 with a standard error of estimate of 3.968 and can predict motor ability in college men with 62 per cent improvement over a best guess. The battery is justifiable on the basis of its high validity, the high objectivity and reliability of its items, its inherent interest to the student, its contribution to safety and physical suitability, and especially, its economy in test administration. Something is lost in predictive power over the six-item test but there is a great gain in test administrative economy.

This battery is recommended only when a quick method of classification is desired or during inclement weather. The battery does not give direct representation to all the factors of motor ability. However, it does sample widely of the factors accepted as highly related to motor ability and it indirectly gives representation to all the factors considered highly related to motor ability by cutting across several factors as secondary measures. The regression equation in raw score form is:

$X_o = .4734$ (standing broad jump in inches) $+ .6064$ (medicine ball put in feet) $- 2.4305$ (zigzag run in tenths of seconds) $+ 43.6410$.

The regression equation in standard score form is:

$X = .3770$ (standing broad jump) $+ .3854$ (medicine ball put) $+ .3741$ (zigzag run).

SCORING TABLES

Scoring tables are provided with the raw score, *T*-scores, and weighted standard scores for each test item. The raw scores were changed into weighted standard scores through the use of the multiple correlation technique. The Beta weights of the regression equation in standard score form were reduced to simplest form and the following weights were obtained: 2.2 (standing broad jump) + 1.6 (softball throw) + 1.6 (zigzag run) + 1.3 (wall pass) + 1.2 (medicine ball put) + 60-yard dash. These weights were multiplied times the *T*-scores and a scoring table devised. This scoring table is shown in Table 1 (p. 256). The weighted standard scores may be summed and a General Motor Ability Score obtained.

In devising a scoring table for the three item indoor battery, the same technique as described for the six item test was used. However, as may be noted by referring to the regression equation in standard score form, the Beta weights for the three items were so comparable in size that all items had the same weightings. Thus, the *T*-scores became the weighted scores for the indoor test. This is most convenient since the same scoring table as shown in Table 1 may be used for both tests. In the case of Test Number Two, the weighted motor ability score is found under the *T*-scores. The *T*-scores are the middle one of the three columns shown under each item in Table 1 (p. 256).

NORMS

Test scores should indicate performance in relation to norms which have been established for the particular groups to be classified. Such norms are provided for both Battery Number One and Battery Number Two for the following two groups: (a) for college men on an unclassified basis and (b)

TABLE 2

Norms for the General Motor Ability Test Numbers One and Two for College Students

| General Motor Ability Rating | General Motor Ability Score | |
|------------------------------|-----------------------------|-----------------|
| | Test Number One | Test Number Two |
| Excellent | 550 Up | 185 Up |
| Good | 481-549 | 163-184 |
| Average | 410-480 | 138-162 |
| Poor | 341-409 | 116-137 |
| Inferior | 340 Down | 115 Down |

TABLE 3

Norms for the General Motor Ability Test Numbers One and Two for Physical Education Major Students in College

| General Motor Ability Rating | General Motor Ability Score | |
|------------------------------|-----------------------------|-----------------|
| | Test Number One | Test Number Two |
| Excellent | 586 Up | 197 Up |
| Good | 534-585 | 180-196 |
| Average | 480-533 | 161-179 |
| Poor | 428-479 | 143-160 |
| Inferior | 427 Down | 142 Down |

for physical education major students. These norms are shown in Tables 2 and 3. They are temporary and local in nature but will be extended.

After administration, the test's raw scores can be recorded on a score card. By referring to the Scoring Table the raw scores may be converted into *T*-scores and weighted standard scores. The weighted standard scores are summed and a General Motor Ability Score obtained. This score is referred to the appropriate table of norms and the student's Motor Ability Rating is found.

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Spectator Problems in Secondary School Athletics¹

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Abstract

A survey was conducted among high school principals, physical education teachers, and athletic officials to obtain answers to questions concerning the incidence, prevalence, cause, and location of spectator behavior problems. Conclusions indicate that excessive booing of referees or particular players is the major problem; that spectators bringing liquor to games and fights among spectators at games are the next in order of reports; that school enrollment level 501-1,000 is the level exhibiting highest average number of problems per school, and that urban schools report more problems than do rural schools.

IN EXAMINING the field of secondary school athletics, there seems to be a group of problems which stands apart from those most often considered by educators. This group constitutes the problems which are caused by the behavior of spectators at athletic contests. Unsocial spectator behavior, it would seem, can be one of the most eye-catching weaknesses of the athletic program, and because of this may often cause faulty interpretations of the program, thus lowering the quality of public relations. It is thought, also, that the quality of educational experience presented to the pupils through their participation in the spectator role is lowered when spectator problems are in evidence. Because of this, alleviation of these problems where they exist, through a program of spectator education, is of utmost importance.

However, before such a program can be commenced it is valuable to know the extent and nature of the existing spectator problems. This study was undertaken to determine by national survey methods the nature, scope, and extent of spectator problems as they pertain to athletics in secondary schools of the United States in order that it be made increasingly possible for programs of spectator education to be initiated, where needed, under the most carefully planned conditions.

Procedure

Questionnaires were sent to 461 high-school principals, 461 high-school physical education teachers (men), 461 high-school physical education teachers (women), and 456 athletic officials (referees and umpires). Each state received questionnaires in number proportional to the population of the state;

¹This report is taken from the author's unpublished Master's thesis, *A Study of Problems Arising from the Attendance of Spectators at the Athletic Contests of the Secondary Schools of the United States*, at the University of Maryland, College Park, Maryland. 257 pp.

except that no state received less than 20 nor more than 80 questionnaires. Only public senior high schools were polled. The District of Columbia was included in the survey, except that no officials in that area were contacted. The results were tabulated by geographic area as well as by reference to the total United States. The geographic areas selected were identical with the districts of the AAHPER: Central, Eastern, Midwest, Northwest, Southern, and Southwest.

A standard list of problems was devised to be referred to by those filling out the questionnaire. This list included the following problems:

1. Riots, before or after games in the school or community.
2. Fights among spectators at games.
3. Excessive booing of referees or particular players.
4. Throwing of articles onto playing area.
5. Vandalism (stealing, breakage, etc.)
6. Selling of tickets for prices higher than face value—scalping.
7. Spectators bringing liquor to games.
8. Gambling.
9. Other (specify)
10. None.

The study had as its specific objective the answering of the following questions:

1. What spectator problems do questionnaire returners report most often?
2. What groups are thought by questionnaire returners to be the cause of spectator problems?
3. What sports are thought by questionnaire returners to be sports in which spectator problems commonly arise?
4. In what level of school population are spectator problems reported most often?
5. Do rural or urban schools report the most spectator problems?
6. Does the place in which the athletic contest takes place influence the incidence of spectator problems?
7. What problems are reported by athletic officials to be typical of the various sports?

TABLE I
Questionnaire Returns

| To Whom Sent | Number Sent | Number Returned | Percent Returned |
|---|-------------|-----------------|------------------|
| Principals _____ | 461 | 307 | 66.5 |
| Physical education teachers (boys) _____ | 461 | 289 | 62.7 |
| Physical education teachers (girls) _____ | 461 | 191 | 41.4 |
| Officials _____ | 456 | 272 | 59.6 |
| Total _____ | 1839 | 1059 | 57.5 |

Results

What spectator problems do questionnaire returners report most often? Over the total United States, athletic officials returned the most questionnaires reporting excessive booing of referees or particular players, throwing of articles onto playing floor, and spectators bringing liquor to games most often. Officials report no problems ninth out of ten possible answers.

Principals, boys' physical education teachers, and girls' physical education teachers constituted the school personnel returning questionnaires. All three of the school groups reported excessive booing most often and no problems second. Principals indicated liquor as the third ranking problem. The men teachers claim vandalism as third most reported and liquor, fights, and gambling next in that order. The women teachers reported liquor as the third most prevalent and fights, vandalism, and throwing of articles next. All returners in all geographic districts report excessive booing most often, except principals, men teachers, and women teachers in the Eastern District who reported the liquor problem most often, and principals in the Central District who reported no problems most often. A detailed summary of these results is presented in Table 2.

TABLE 2
Problems Reported Most Often by Questionnaire Returners

Problems:

1. Riots, before or after games, in school or community.
2. Fights among spectators at games.
3. Excessive booing of referees or particular players.
4. Throwing of articles onto playing area.
5. Vandalism (stealing, breakage, etc.).
6. Selling of tickets for prices higher than face value—scalping.
7. Spectators bringing liquor to games.
8. Gambling.
9. Other.
10. None.

| Returners | Number of Reports Per Problem | | | | | | | | | | Total 1-9 |
|--|-------------------------------|-----|-----|-----|-----|----|-----|-----|----|-----|--------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| Principals..... | 8 | 50 | 125 | 18 | 58 | 7 | 88 | 45 | 7 | 110 | 406 |
| Physical education teachers (boys)..... | 2 | 52 | 113 | 29 | 66 | 3 | 61 | 35 | 3 | 94 | 364 |
| Physical education teachers (girls)..... | 11 | 39 | 86 | 26 | 37 | 4 | 44 | 16 | 2 | 64 | 265 |
| Officials..... | 40 | 75 | 194 | 102 | 47 | 32 | 96 | 58 | 11 | 39 | 655 |
| Total..... | 61 | 216 | 518 | 175 | 208 | 46 | 289 | 154 | 23 | 307 | 1690 |

What groups are thought by questionnaire returners to be the cause of spectator problems? Principals and physical education teachers agreed that members of the community who are not students are the primary causes of the problem. This is true in all geographic districts. People from outside the community ranked second; visiting students, third; and students fourth. A detailed summary of these results is presented in Table 3.

What sports are thought by questionnaire returners to be sports in which spectator problems commonly arise? Basketball, football, baseball, and track in that order were thought to be sports in which spectator problems most commonly arise. All categories of returners of questionnaires ranked the sports in that order. Basketball received just under twice the number of reports received by football (basketball—448; football—240). Athletic offi-

cials reported most often for basketball, but less than any other group for football. Gymnastics and boxing received the least number of reports, which may in part be attributed to the small number of schools sponsoring these sports. A detailed summary of these results is presented in Table 4.

TABLE 3
Groups Considered by the Questionnaire Returners to be the Cause of Spectator Problems

| Returners | Number of Reports Per Group | | | |
|--|-----------------------------|-------------------|-----------------------------------|-------------------------------|
| | Students | Visiting Students | Members of Community Not Students | People From Outside Community |
| Principals | 21 | 38 | 175 | 95 |
| Physical education teachers (boys) .. | 35 | 52 | 162 | 76 |
| Physical education teachers (girls) .. | 33 | 43 | 102 | 35 |
| Total | 89 | 133 | 439 | 206 |

TABLE 4
Sports Considered by Questionnaire Returners To Be Sports in Which Spectator Problems Commonly Arise

| Sports | Number of Schools Sponsoring Sports | Number of Reports | | | |
|------------------|-------------------------------------|-------------------|------------------------------------|-------------------------------------|-----------|
| | | Principals | Physical Education Teachers (boys) | Physical Education Teachers (girls) | Officials |
| Football | 306 | 98 | 70 | 38 | 34 |
| Basketball | 363 | 109 | 107 | 81 | 151 |
| Track | 359 | 10 | 7 | 2 | 1 |
| Baseball | 306 | 10 | 16 | 8 | 8 |
| Soccer | 19 | 2 | | | |
| Gymnastics | 28 | | | | |
| Wrestling | 32 | 2 | | 1 | |
| Boxing | 9 | 1 | 1 | | 1 |
| Ice hockey | 14 | 1 | 2 | | |
| None | | | | | |
| Other | 203 | | | | |

In what level of school population (enrollment) are spectator problems reported most often? Most returns were received from the level 0-500 enrollment. One hundred and ninety-nine schools returned questionnaires reporting 542 problems. This average of 2.7 problems per school is not a true average, but represents merely a convenient method of comparing the returns for each level of population. It was derived by dividing the total number of reported problems by the number of schools returning questionnaires, no account being taken of the returner's occupation. The level 501-1,000 enrollment returned 91 questionnaires reporting 264 problems for an average of 2.9 problems. Fifty-one schools in the population level, 1,001-1,500 reported a total of 148 problems. These two areas obtained the highest average of 2.9 problems; they were highest in 5 of the 6 geographic areas. Schools of enrollment of 2,000 up rank lowest in average over the whole United States, and rank lowest in five of the AAHPER districts. This may, in part, be explained by the low number of returns (in two districts no returns were received from this level

TABLE 5
Levels of School Population in Which Spectator Problems Are Reported

| Total School Population | Number of Schools | Number of Reports for Each of 10 Problems by Questionnaire Returners | | | | | | | | | | | | | | | | | | | | | | | | | | Total 1-9 | Average Per School | | | | |
|-------------------------|-------------------|--|----|----|---|----|---|----|----|----|----|----------------------------|----|----|----|----|----|----|---|----|----|-----------------------------|----|----|----|----|----|-----------|--------------------|-----|-----|-----|-----|
| | | Principals | | | | | | | | | | Physa. Educ. Teachers—Boys | | | | | | | | | | Physa. Educ. Teachers—Girls | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 1 | 2 | 3 | 4 | 5 | 6 | | | 7 | 8 | 9 | 10 |
| 0- 500 | 199 | 3 | 23 | 74 | 7 | 41 | 2 | 50 | 28 | 4 | 57 | 14 | 61 | 14 | 41 | 2 | 31 | 21 | 1 | 48 | 5 | 13 | 40 | 12 | 20 | 24 | 10 | 1 | 32 | 542 | 2.7 | | |
| 501-1,000 | 91 | 3 | 14 | 28 | 4 | 8 | 2 | 23 | 10 | 3 | 31 | 1 | 17 | 21 | 7 | 14 | 1 | 16 | 9 | 2 | 28 | 3 | 14 | 26 | 9 | 8 | 2 | 12 | 6 | 1 | 20 | 264 | 2.9 |
| 1,001-1,500 | 51 | 1 | 9 | 15 | 5 | 6 | 2 | 10 | 4 | 16 | 12 | 23 | 5 | 8 | 10 | 3 | 8 | 3 | 7 | 11 | 4 | 5 | 1 | 4 | 7 | 14 | 8 | 7 | 14 | 2.9 | 2.9 | | |
| 1,501-2,000 | 23 | 1 | 1 | 7 | 2 | 1 | 1 | 4 | 3 | 3 | 1 | 6 | 5 | 2 | 2 | 4 | 2 | 9 | 4 | 7 | 1 | 2 | 1 | 3 | 5 | 5 | 5 | 5 | 58 | 2.5 | 2.5 | | |
| 2,001 up | 8 | 3 | 1 | | | 2 | | 1 | | 3 | 3 | 3 | 2 | 1 | 2 | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 19 | 2.4 | 2.4 | | |

and in the third only one was received). Excessive booing was reported most often at all levels of enrollment, while no problems ranked second at all levels, with the exception of level 501-1,000 where the order is reversed. A detailed summary of these results is presented in Table 5.

Do Rural or Urban schools report the most spectator problems? One hundred and eighty-two rural schools, 49 per cent of the total number of schools reporting, reported 453 problem instances. This constituted 44 per cent of the total problem instances. One hundred and thirty-five reports of no problems were received from these schools. The 192 urban schools reported 577 problem instances and 133 answers of no problems. The 577 problems constituted 55 per cent of the total number. Urban schools listed more problems than rural schools in each problem area except vandalism and no problems. However, to examine the figures critically, it is necessary to draw the ratio of number of problem reports to number of schools. The process serves to equate the two groups and allows the reader to compare the figures. The results indicate that urban schools have a higher problem ratio in each area except vandalism, gambling, and no problems. A detailed summary of these results appears in Table 6.

TABLE 6
Problems Reported by Rural and Urban Schools

| Problems | Rural Schools | | Urban Schools | |
|-------------------|-------------------|-----------------------------|-------------------|-----------------------------|
| | Number of Reports | Ratio of Reports to Schools | Number of Reports | Ratio of Reports to Schools |
| 1 | 6 | .03 | 15 | .08 |
| 2 | 47 | .26 | 94 | .49 |
| 3 | 152 | .84 | 172 | .89 |
| 4 | 26 | .14 | 47 | .24 |
| 5 | 82 | .45 | 80 | .42 |
| 6 | 6 | .03 | 8 | .04 |
| 7 | 90 | .49 | 103 | .54 |
| 8 | 47 | .26 | 49 | .26 |
| 9 | 3 | .02 | 9 | .05 |
| 10 | 135 | .74 | 133 | .69 |
| Number of schools | 182 | | 192 | |

Does the place in which the athletic contest takes place influence the incidence of spectator problems? The returns on this item divided themselves into three groups: schools playing games only in the home school; schools playing in the home school and in other schools; and, schools playing in these two places and in outside arenas. The first group (30 schools) reported 50 problems for an average of 1.66 problems. The second group (203 schools) reported 545 problems for an average of 2.68 problems. The third group (120 schools) reported 441 problems for an average of 3.67 problems. All three groups reported excessive booing of referees or particular players most often, and no problems second. A ratio of number of problems to number of schools indicates that the third group has the largest problem in all

problem areas except scalping. A detailed summary of these results appears in Table 7.

TABLE 7
Location of Contests Exhibiting Spectator Problems

| Location of Games | Number of Schools | Number of Reports per Problem from Principals and Physical Education Teachers | | | | | | | | | |
|--|-------------------|---|-------------|---------------|-------------|-------------|------------|-------------|-------------|------------|--------------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| In schools..... | 30 | | 5 (.17) | 19 (.63) | 3 (.10) | 8 (.27) | 1 (.03) | 9 (.30) | 5 (.17) | | 17 (.57) |
| In home schools and other schools | 203 | 12 (.06) | 66 (.33) | 174 (.86) | 37 (.18) | 95 (.47) | 8 (.04) | 98 (.48) | 49 (.24) | 6 (.02) | 140 (.69) |
| In home schools, other schools and outside arenas..... | 120 | 9 (.08) | 70 (.58) | 132 (1.10) | 33 (.28) | 58 (.48) | 5 (.04) | 86 (.72) | 42 (.35) | 6 (.05) | 106 (.88) |

NOTE: Two schools did not report on this item.
The decimal figure indicates ratio of number of reports to number of schools.

What problems are reported by athletic officials to be typical of the various sports? Excessive booing, throwing of articles onto playing area and fights received the most reports for the sport of basketball. The liquor problem, excessive booing and fights received the most reports for football. Booing received the most reports for baseball. Although officials were asked to report on nine sports, only three were reported to have problems typical to them. A summary of these results is presented in Table 8.

TABLE 8
Problems Reported By Athletic Officials To Be Typical of the Various Sports

| Sport | Number of Reports per Problem | | | | | | | | |
|------------|-------------------------------|----|----|----|---|---|----|----|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Football | 9 | 18 | 18 | 6 | 5 | 2 | 20 | 11 | 3 |
| Basketball | 9 | 18 | 64 | 27 | 6 | 3 | 14 | 11 | 6 |
| Track | | | | | | | | | |
| Baseball | 2 | | 4 | 1 | | | 1 | | |
| Soccer | | | | | | | | | |
| Gymnastics | | | | | | | | | |
| Wrestling | | | | | | | | | |
| Boxing | | | | | | | | | |
| Ice hockey | | | | | | | | | |
| None | | | | | | | | | |
| Other | | | | | | | | | |

Conclusions

The following conclusions and recommendations may be based upon the results of this survey:

1. Spectator behavior problems have arisen in the secondary schools of the United States to the extent that education for their alleviation is recommended.

2. The most prevalent spectator problem is excessive booing of referees or particular players. This is followed in order by: spectators bringing liquor to games; fights among spectators at games; vandalism; throwing of articles onto playing area; gambling; riots in school or community before or after games; ticket scalping; and other problems (noteworthy among these was "coach's attitude").

3. Principals and physical education teachers alike report excessive booing of referees or particular players as the most prevalent problem.

4. Basketball is felt most often by all returners to be the sport in which problems commonly arise. Football was rated second.

5. Problems are reported most often in school population levels 501-1,000 and 1,001-1,500. Zero-500 ranked next and the higher levels ranked lowest.

6. Members of the community who are not students are reported by principals and physical education teachers to be the primary cause of spectator problems. People from outside the community were rated second.

7. Schools sponsoring athletic contests in arenas outside of school, as well as in school, reported relatively the most problems. Schools sponsoring contests in home schools and other schools reported less problems than the first group but more than the third group of schools sponsoring contests in the home school only.

8. Athletic officials report problems of excessive booing of referees or particular players, throwing of articles onto playing area, and fights among spectators at games to be typical of basketball. They report excessive booing, fights, and spectators bringing liquor to games as typical of football.

9. Urban schools report slightly more problems than do rural schools. (Based upon ratio of reports to schools.)

10. The Southern and Southwestern United States are the areas in which the spectator problem is most serious. (Based upon average reports per questionnaire returner.)

Quality of Administrative Provisions for Physical Education in New York State¹

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Abstract

In this study, there were examined the relationships between the quality of the non-instructional provisions for physical education in 100 secondary schools of New York State and factors involving size of school, wealth of community, and training and experience of the physical education director. The quality of the provisions was more closely related to wealth of the community than to any other factor. Secondary schools enrolling less than 200 pupils tended to lack essential provisions. Amount of training of the director was more closely related to the quality of provisions than amount of experience.

NUMEROUS STUDIES of instructional programs of physical education have pointed out that the effectiveness of teaching is limited by the extent to which adequate provisions of facilities, equipment, personnel, scheduled time, and certain services are provided within the given school. In order to best provide for the instructional program, it is important to understand what conditions seem most conducive to the development of adequate non-instructional provisions within the school.

This investigation is an attempt to examine some of the factors which may be related to the quality of administrative provisions for physical education for boys in the public secondary day schools of New York State. Administrative provisions for physical education are defined as the basic non-instructional provisions for carrying on physical education activities, as measured by the *LaPorte Health and Physical Education Score Card No. 11* (9).

The factors considered are size of school, size of community, expenditure for public education in the given school district, per pupil valuation in the given school district, amount of training of the school physical education director, and amount of experience of the school physical education director.

Procedure

From the 785 public secondary day schools of New York State enrolling boys in grades 10, 11, and 12, 100 schools were selected by proportional stratified random sampling based on the size of the schools and the size of the communities in which the schools were located. The stratification of the sample is shown in Table 1.

An estimate of observer reliability in the use of the *LaPorte Score Card* was obtained, based on independent ratings of six schools by the investigator and by two other observers who each rated three of the schools. The reliability

¹This study was made in partial fulfillment of the requirements for the degree of Doctor of Education in the School of Education, Syracuse University, 1953, under the direction of Dr. John H. Shaw.

TABLE 1
Stratification of School Sample by School and Community Size

| School Size | Community Size | | | | | | | | |
|-------------|----------------|---------|-------------|-------------|-------------|--------------|---------------|----------------|------------|
| | 0-499 | 500-999 | 1,000-1,499 | 1,500-2,499 | 2,500-4,999 | 5,000-14,999 | 15,000-49,999 | 50,000-999,999 | 1,000,000+ |
| 2,000 + | | | | | | 1 | | | 5 |
| 1,000 + | | | | | | | | | |
| 1,999 | | | | | | | 1 | 2 | 3 |
| 500-999 | | | | | | 2 | 5 | 4 | |
| 300-499 | | 1 | | 1 | 1 | 5 | 1 | 1 | |
| 200-299 | | 2 | | | 5 | 2 | | | |
| 150-199 | | 2 | 2 | 2 | 3 | 1 | | | |
| 100-149 | 1 | 3 | 2 | 5 | 2 | | | | |
| 50-99 | 7 | 11 | 5 | 1 | | | | | |
| 0-49 | 4 | 5 | 1 | | | | | | |
| Total | 12 | 24 | 10 | 9 | 11 | 11 | 8 | 7 | 8 |
| | | | | | | | | | 100 |

coefficients for the total score card, based on the ratings of the investigator and each of the other observers, were .988 and .991 respectively.

Each of the 100 schools included in the sample was visited by the investigator during the school year 1952-53, and rated by means of the *LaPorte Score Card* to obtain a measure of the quality of the administrative provisions for physical education.

Measures of the factors considered were obtained from records of the state education department, local school records, and other public records.

The data were analyzed primarily by linear and non-linear correlational techniques. Relationships were determined between each of the given factors and total score on the *LaPorte Score Card*, and between each of the given factors and each of the 10 subsections of the score card: I—Program of activities, II—Outdoor areas, III—Indoor areas, IV—Locker and shower areas, V—Swimming pool, VI—Supplies and equipment, VII—Medical examinations and health services, VIII—Modified-individual activities, IX—Organization and administration of class programs, and X—Administration of intramural and interschool athletics.

Findings

Over-all measures of the relationship of the given factors to the quality of the administrative provisions for physical education were obtained by Pearson r 's (linear correlation) and by epsilon² (non-linear correlation). The resulting r 's and ϵ 's are shown in Tables 2 and 3.

²Charles C. Peters and Walter R. VanVoorhis. *Statistical Procedures and Their Mathematical Bases*. New York: McGraw-Hill Book Co., Inc., 1940. pp. 312-330, 494-497.

TABLE 2
Coefficients of Correlation Between Total LaPorte Score and Certain Factors ($N = 100$)

| Factor | Total Experience of Director | Exper. of Director — present position | Amount of Training of Direc. | % Expenditures Paid by State | Per Pupil Valuation | Per Pupil Expenditure | Community Size | School Size |
|---|------------------------------|---------------------------------------|------------------------------|------------------------------|---------------------|-----------------------|----------------|-------------|
| Total LaPorte Score..... | .146 | .048 | .361 ¹ | — .230 | .315 | .316 | .134 | — .017 |
| School Size..... | .445 | .530 | .450 | — .620 | .363 | .051 | .885 | |
| Community Size..... | .456 | .473 | .472 | — .770 | .539 | .030 | | |
| Per Pupil Expenditure..... | .040 | .079 | .241 | — .460 | .622 | | | |
| Per Pupil Valuation..... | .340 | .278 | .357 | — .821 | | | | |
| % Expenditures paid by State..... | .319 | — .336 | — .481 | | | | | |
| Amount of Training of Director..... | .271 | .254 | | | | | | |
| Experience of Director in Present Position..... | .636 | | | | | | | |

¹ The correction factor $\sqrt{\frac{N-n}{N}}$ has been applied to the standard error of r , since the sampling has been made from a finite population. Throughout this paper, significance at the 5% level of confidence is indicated by single underlining, and the 1% level of confidence by double underlining.

TABLE 3
Correlation Ratio (ϵ) Between Total LaPorte Score and Certain Factors ($N = 100$)

| Factor | Total Experience of Director | Exper. of Director — present position | Amount of Training of Direc. | % Expenditures Paid by State | Per Pupil Valuation | Per Pupil Expenditure | Community Size | School Size |
|--|------------------------------|---------------------------------------|------------------------------|------------------------------|---------------------|-----------------------|----------------|-------------|
| Total LaPorte Score..... | .033 | .063 | .349 | .235 | .463 | .331 | .223 | .384 |
| School Size..... | .605 | .503 | .425 | .623 | .483 | .141 | .889 | |
| Community Size..... | .541 | .453 | .514 | .699 | .514 | .290 | | |
| Per Pupil Expenditure..... | .251 | .232 | .340 | .262 | .625 | | | |
| Per Pupil Valuation..... | .304 | .269 | .480 | .870 | | | | |
| % Expenditures paid by State..... | .447 | .354 | .569 | | | | | |
| Amount of training of Director..... | .336 | .186 | | | | | | |
| Experience Director in Present Position..... | .844 | | | | | | | |

The relationship of each factor to the total LaPorte Score was also examined under certain limited conditions. The resulting r 's are shown in Table 4.

TABLE 4
Coefficients of Correlation Between Total LaPorte Score and Certain Factors Under Restricted Conditions

| Factor | School Size | Community Size | Per Pupil Expenditure | Per Pupil Valuation | Amount of Training of Direc. | Exper. of Director—present position | Total Experience of Director |
|--|-------------|----------------|-----------------------|---------------------|------------------------------|-------------------------------------|------------------------------|
| Schools under 200 pupils ($N = 57$) | .518 | .075 | .017 | .158 | .157 | .094 | .058 |
| Schools of 200–999 pupils ($N = 28$) | .100 | .118 | .424 | .380 | .476 | -.333 | -.048 |
| Schools over 1000 pupils ($N = 8$) | .638 | .306 | .171 | .437 | .737 | -.248 | .445 |
| Vocational schools ($N = 7$) | .090 | .019 | ¹ | | -.005 | -.380 | -.347 |
| Per pupil expend. under \$250 ($N = 18$) | .480 | .413 | | .469 | .538 | .180 | .024 |
| Per pupil expend. \$250–\$349 ($N = 60$) | .215 | .131 | | .110 | .328 | -.110 | .132 |
| Per pupil expend. over \$350 ($N = 15$) | .521 | .493 | | .485 | .793 | .510 | .562 |
| Per pupil valua. under \$4,000 ($N = 16$) | .546 | .279 | .539 | | .328 | .339 | .090 |
| Per pupil valua. \$4,000–\$14,999 ($N = 55$) | .143 | .035 | .137 | | .079 | -.098 | -.036 |
| Per pupil valua. over \$15,000 ($N = 17$) | .103 | .333 | .302 | | .659 | -.177 | .225 |
| Facilities built before 1916 ($N = 8$) | .312 | .551 | .965 | .801 | .418 | .574 | .362 |
| Facilities built 1916–1932 ($N = 49$) | .443 | .482 | .367 | .434 | .570 | .081 | .364 |
| Facilities built 1933–1941 ($N = 29$) | .483 | .339 | .096 | .348 | .359 | .265 | .292 |
| Facilities built since 1946 ($N = 7$) | .887 | -.075 | .079 | .529 | .302 | .884 | .845 |

¹ The financial support of vocational schools is not on a basis comparable to that of the other schools, owing to Federal aid and certain other factors.

SCHOOL SIZE

Correlation of school size with total LaPorte Score was found to be curvilinear ($r = .384$)³, with a steady increase in score until school enrollment reached 200, after which the curve tended to level off. Above an enrollment of 500 the total score tended to dip slightly, then rose steadily among the very large schools as scores for swimming pool and modified-individual program tended to increase. Both the very large schools and the very small schools scored poorly in supplies and equipment and in medical examinations and

³Significant at the 1% level of confidence. For the method used in testing the significance of epsilon, see Peters and VanVoorhis, pp. 324-325, 421-422, 494-497.

health services. In these respects, the small school tended to be hampered by complete absence of certain provisions, while the large school tended to have inadequate provisions in terms of per pupil load.

Removing swimming pool and modified-individual program from consideration dropped the schools enrolling over 1000 slightly below those enrolling 200-999 pupils in total score on the other eight sections.

COMMUNITY SIZE

No significant relationship was found between community size and total LaPorte score when the total population of schools was considered ($r = .134$). This is possibly due in part to the large number of centralized schools serving rural communities in New York State.

Examination of Table 4 indicates that school size tends to be more closely related to the quality of administrative provisions for physical education than is community size under most of the restricted conditions. However, there seems to be evidence that other community characteristics not included in this study may have a profound effect on the quality of administrative provisions for physical education.

PER PUPIL EXPENDITURE

A positive linear relationship was found between the per pupil expenditure and total LaPorte score when the total population of schools was considered ($r = .316$).

Table 4 suggests that possibly the relationship is due to more than sheer buying power. For example, among poorer school districts (per pupil valuation under \$4,000) the effect of increasing expenditures was much greater than among the wealthier districts. Perhaps the concern of the community for its schools (as reflected by the relative weight of the school tax load it is willing to assume) has a powerful influence on the relationship.

PER PUPIL VALUATION

A curvilinear relationship was found between per pupil valuation and total LaPorte score when the total sample of schools was considered ($\epsilon = .463$). The curve tended to rise gradually until a valuation per pupil of \$5,000-\$6,999 was reached then leveled off. Above \$20,000 per pupil, the curve again turned upward very sharply.

The findings of this study tend to agree with studies which have been made in other aspects of the total educational program; namely, that wealth of the community was the factor most closely related to the quality of the provisions for the educational programs.

AMOUNT OF TRAINING OF THE SCHOOL PHYSICAL EDUCATION DIRECTOR

A positive linear relationship was found between the amount of training of the director and total LaPorte score when the total sample of schools was considered ($r = .361$). When only those schools enrolling more than 200 pupils were considered, the relationship was much higher.

It has been suggested that the relationship between amount of training of the director and total LaPorte score is due to the poorer schools with less

adequate provisions hiring less expensive teachers. (The salary schedules allow \$200 extra for a Master's degree, and some allow extra for a sixth year of training.) However, the partial correlation between training of the director and total LaPorte score with per pupil expenditure held constant was $r_{01.2} = .309$. This was significant at the 1-per-cent level of confidence, and suggests that the director himself may have considerable influence on the quality of the non-instructional provisions for physical education in his school.

AMOUNT OF EXPERIENCE OF THE SCHOOL PHYSICAL EDUCATION DIRECTOR

No significant relationship was found between amount of experience of the school physical education director and total LaPorte score when the total sample of schools was considered ($r = .146$). Among schools whose directors have had seven or less years of experience, a positive relationship was found ($r = .428$). After seven years of experience, the distribution was characterized by increasing variability of total LaPorte score. Some directors tended to continue their professional growth and improvement of their departments, while others either remained static or slipped backward with the passing years.

VOCATIONAL SCHOOLS

Seven vocational schools were included in the sample. The mean total LaPorte score for these seven schools was 88.429, while the mean for the other 93 schools was 109.610. The hypothesis that these means could have been random samples from a common population of means may be rejected at the 5-per-cent level of confidence. It was also decided, after discussing provisions for physical education in these schools with city directors and individual school directors, that the vocational schools should be examined separately in terms of the given factors.

No significant relationships were found in vocational schools between total LaPorte score and any of the factors considered in this study.

Conclusions

1. The only factor which was found to be significant among small schools (enrolling less than 200 pupils) in relation to the quality of the administrative provisions for physical education was school size. Evidence points out the need for centralization of districts which are too small to provide adequately for the program of physical education.
2. The only factor found to be significant among large schools (over 1,000 pupils) was the training of the director.
3. Among medium size schools (200-999 pupils) wealth, per pupil expenditure, and training of the director were all significantly related to the quality of the provisions.
4. When total program is considered, the schools over 1,000 pupils tend to achieve the highest scores. However, when swimming pools and modified-individual activities are removed from consideration, these schools tend to lag slightly behind the medium-size schools in the remainder of the program.

5. Training of the director is a significant factor in relation to the quality of the provisions among schools at all expenditure levels, although it is most significant among the high per pupil expenditure schools. The schools with most money to spend tend to hire teachers with more training and also have better provisions. Yet even among schools spending less than \$250 per pupil, the schools hiring teachers with more training tend to have better provisions. Most of the correlation between the training of the director and total LaPorte score is not accounted for by per pupil expenditure.

6. The amount of experience of the director is not significantly related to the quality of the provisions when the total sample is considered. However, within the range of 0-7 years of experience, the relationship is highly significant.

7. The factor found to be most closely related to the quality of the provisions was the wealth of the community.

8. Large schools tend to have better provisions for the following aspects of the program: program of activities, swimming pool, and modified-individual activities.

9. Schools of medium size (200-999) pupils tend to have better provisions for supplies and equipment, medical examinations and health services, and administration of intramural and interschool athletics.

10. Schools spending a larger amount per pupil tend to have better provisions for: indoor areas, locker and shower areas, supplies and equipment, medical examinations and health services, and organization and administration of class programs.

11. Wealthier school districts tend to have better provisions for all aspects of the program except outdoor areas and supplies and equipment.

12. Schools having directors with a greater amount of training tend to have better provisions for all aspects of the program except supplies and equipment.

13. Schools having more experienced directors tend to have better provisions for: swimming pools, medical examinations and health services, and administration of intramural and interschool athletics.

14. This study did not find significant relationships between any of the factors examined and the quality of the administrative provisions for physical education in the vocational schools included in the sample. Because of the small number of vocational schools included in the sample, further study is needed regarding the relationship of various factors to the administrative provisions in the vocational schools.

Summary

The best administrative provisions for physical education for boys in the public secondary day schools of New York State were found among schools enrolling at least 200 pupils in the upper three grades, spending more than \$350 per pupil, having a per pupil valuation of more than \$15,000, a director

with considerable training beyond the Bachelor's degree and with at least seven years of experience.

Although relationships have been pointed out between the administrative provisions for physical education and several factors, a large portion of the variance is still unaccounted for. Some of the factors which might prove fruitful in further study are aspects of the community cultural pattern—particularly the community understanding of what a good physical education program can do, and attitudes toward the program on higher administrative levels.

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Placement of the Gravitational Line in Antero-Posterior Standing Posture

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Abstract

The study was undertaken to locate the gravitational line in relation to the various body segments—in particular, the ankle and knee joints. It is at these joints where there is a divergence of expert opinion on the location of the gravitational line.

The line was found to lie a mean distance of 0.95 cm. in front of the anterior border of the tibia at the ankle. In the majority of cases it ran through the patella, anterior to the acromion process and through the ear lobe.

More study is needed on the location of the gravitational line in relation to the head.

A LACK OF UNIFORMITY about the placement of the gravitational line in antero-posterior posture is to be found on consulting references on posture, kinesiology and corrective physical education. This is particularly true of descriptions as to where it intersects the base of support. This difference prompted the authors to investigate the placement of the line of gravity at both the knee and ankle joints so that some more definite statement could be made and, if possible, simplified landmarks described.

Hellebrandt (4) has been the most specific, but even though she gives an accurate measurement, her landmark is not described in precise terms. She states: "The average location of the line of gravity is 5.08 cm. in front of the ankle joint. It varies widely from a position nearly coincident with the axis of rotation of the ankle joint to one at the extreme limits of the antero-posterior support." The range of placement was from 0.388 to 13.536 cm. in front of the ankle joint. She cautions that the length of the foot must be taken into consideration in considering the relation of the gravitational line to the malleolus. The average distance of the line of gravity from the malleolus was found in her study to be 4.928 cm. for one group of 327 women and 5.65 cm. for another group of 87 women. However, she fails to mention whether it is the center, the anterior border or the posterior border of the malleolus from which her measurement was taken. It is definitely placed outside of the ankle joint however.

Drew and Kinzley (1, p. 37), though agreeing with Hellebrandt, still do not describe the relation of the gravitational line at the ankle accurately, as they state that: "The line of gravity . . . is shown to pass in the frontal plane, in front of the ankle joint, slightly in front of the knee joints, behind the center of the hip joint, through the sacroiliac junction, intersects the spine at the

lumbodorsal and cervico-dorsal junctions and passes behind the ear at the mastoid process."

Glassow (2, p. 76) writes: "Authorities tell us also that the body is in good balance when a perpendicular line may be passed: 1. in front of the outer malleolus, 2. just back of the patella, 3. through the middle of the hip, 4. through the middle of the tip of the shoulder, 5. through the lobe of the ear." Rathbone (10, p. 78) defines the position of the gravital line in the following manner: "a vertical line dropped from the center of gravity passes just in front of the knee and ankle joints and touches the ground within the area between the feet." In speaking of the posture of children, Stone and Deyton (14, p. 128) suggest that the child stand beside the plumb line so that it falls downward from the mastoid process. They continue: "Observe the profile of the child to see whether this plumb line falls from the mastoid process through the acromionclavicular joint, through the great trochanter of the femur, by the lateral side of the patella and through the cuboid bone just in front of the lateral malleolus."

Scott (12, p. 121) describes the placement of the gravital line by saying: "if the person is standing in an erect position without any load, the external landmarks through which the frontal plane passes are approximately as follows: (1) a little anterior to the external malleolus, (2) the anterior portion of the knee joint, (3) the hip joint, (4) the acromial prominence of the shoulder, and (5) the posterior portion of the ear." She also cites Hellebrandt's study giving the more exact placement of the line in relation to the ankle.

Authors who agree with Hellebrandt in their descriptions but show diagrams placing the line of gravity differently from their descriptions include Hawley (3, p. 77), who states: "... the line of gravity ... passes approximately through the lobe of the ear and the tip of the shoulder, ... it bisects the pelvic region and passes slightly anterior to the mid-points of the knee and ankle joints." On page 73, however, she shows the line passing through the malleolus. Winter (17, p. 22) has written: "the weight-bearing line passes through the center of the knee and in front of the ankle joints." However, the weight-bearing line shown in her diagram is in front of the malleolus but too close to it to coincide with Hellebrandt's findings. Kendall, Kendall and Boynton (7, p. 11) list the surface landmarks that will coincide with the plumb line as: "Through the lobe of the ear ... through the shoulder joint ... approximately midway between front and back of the chest, approximately midway between the back and the abdomen, approximately through the greater trochanter of the femur, slightly anterior to a midline through the knee, slightly anterior to the lateral malleolus (through the calcaneo-cuboid joint)." However, the pictures and X-ray photograph place the gravital line too far back in the foot to coincide with the line of gravity as it was found by Hellebrandt.

Wells (16, p. 353) makes the statement: "... the line of gravity ... lies in the same plane as the mastoid process; intersects the spinal column approximately at the cervicodorsal, dorsolumbar and lumbo-sacral junctions; passes

slightly behind the plane of the hip joints, slightly in front of the plane of the knee joints, in front of the ankle joints; and falls within the approximate center of the base of support." The gravital line in the accompanying illustration passes along the anterior border of the fibula into the foot at the calcaneocuboid joint. Kelly (6, p. 15), while giving no description of the gravital line, shows it passing through the ankle joint.

Lee and Wagner (8, p. 153) write: "An imaginary line drawn from the side view through the top of the head, just back of the ear, through the center of the shoulder joint, just back of the center of the hip joint, just in front of the center of the knee joint, through the center of the ankle joint, is a straight line if the body segment alignment is correct." Their diagram on p. 154 illustrates the line in this position through the center of the ankle joint.

Two opposing points of view are expressed by Metheny and Steindler. In speaking of the body segments, Metheny (9, p. 108) writes: "Gravity pulls through the center of each of these parts, through the common center of each combination of parts, and through the center of the entire structure." Steindler (13, p. 18) on the other hand, writes: "... few if any of these articulations coincide with the line of gravity. Most of the joints have their centers at some appreciable distance away from the weight line and rotatory forces are therefore active about practically all the superimposed articulations." He places the line of gravity approximately 4 cm. in front of the ankle joint.

Thus it can be seen that there is some difference of opinion about the placement of the line of gravity in the lower extremity.

Procedure

There were 66 women subjects ranging in age from 17 to 43 years. All were students, either undergraduate or graduate, at the State University of Iowa.

The standard center of gravity measurement technique described by Reynolds and Lovett (11) was used. Photographs of posture were taken simultaneously with the measurements and drawings, thus necessitating the services of two individuals to take the data.

The subjects stood on a plank 80 cm. long, 30.4 cm. wide and 3.6 cm. thick, which was equipped on top with a board at right angles to the plank and exactly in the center of the plank. The heels were placed against this board. The unusual length of the plank was selected, so that it could be visible on the photograph and yet give the investigator some room to work. A knife edge was fastened to the bottom of each end of the plank. One end of the plank rested on a spring scale while the other knife edge rested on a block of wood the same height as the scale. A diagram of the set-up is shown in Figure I.

A piece of paper was placed on the plank with one edge against the heel board and the subject instructed to step on this with the feet slightly apart and the heels against the heel board. The outlines of both feet were traced and specific landmarks noted. The posterior border of the lateral malleolus

on the leg on the side toward the camera was located and a vertical dropped to the paper to mark its distance from the heel. To find the vertical, a steel ruler was held against the posterior border of the lateral malleolus and the plank. The point where the ruler touched the paper was marked. The distal ends of the first and fifth metatarsal bones of both feet were also marked.

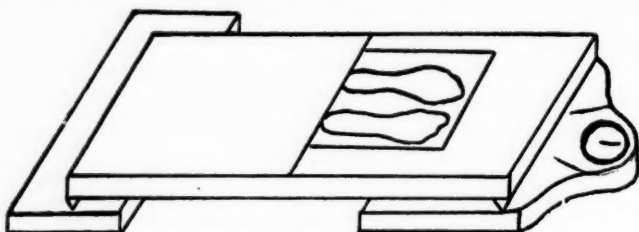


FIG. I. Apparatus for determining center of gravity.

To check where the line of gravity fell in relation to the anterior border of the tibia immediately above the ankle joint, a right angle was constructed so that the relation of this landmark to the line of gravity might be noted. Two blocks of wood $\frac{5}{8}$ in. x $\frac{3}{4}$ in. x 6 in. were joined together by a thin piece of board so that a space $3\frac{3}{8}$ in. wide was left between them. The blocks were checked to be certain that they were square on the bottom. This bridge-like measure was placed across the foot nearest the camera so that the bridge was flush with the anterior border of the tibia. It was possible to note the anterior border of the tibia by placing a mark where the outer block of wood of the bridge touched the paper. When all the landmarks had been located, the photographer slowly counted to three. She opened the shutter of the camera on count one and held it open until after three to give a three-second exposure to the posture picture. The investigator doing the center of gravity measurements read the dial of the scale on count two. If the needle were fluctuating at the time, the midpoint of the fluctuation was used for the reading. Such a method of synchronizing photograph and center of gravity readings had been used successfully by Velez (15) and Keener (5) in previous studies.

After the side view of the subject was taken, she was instructed to step down off the paper while the operator turned the paper a quarter turn so the left side was now flush with the heel board. The subject was instructed to step on the plank with her back toward the camera and to place her feet in the prints that had been drawn previously. A second reading was taken to locate the line of gravity in the sagittal plane. This too, was synchronized with a photograph.

Using the formula $X = \left(\frac{S - B}{T} \times L \right) - \frac{1}{2} L$ and solving for X, the

points at which the line of gravity touched the paper for the frontal and sagittal planes were located. The point at which these two lines intersected was

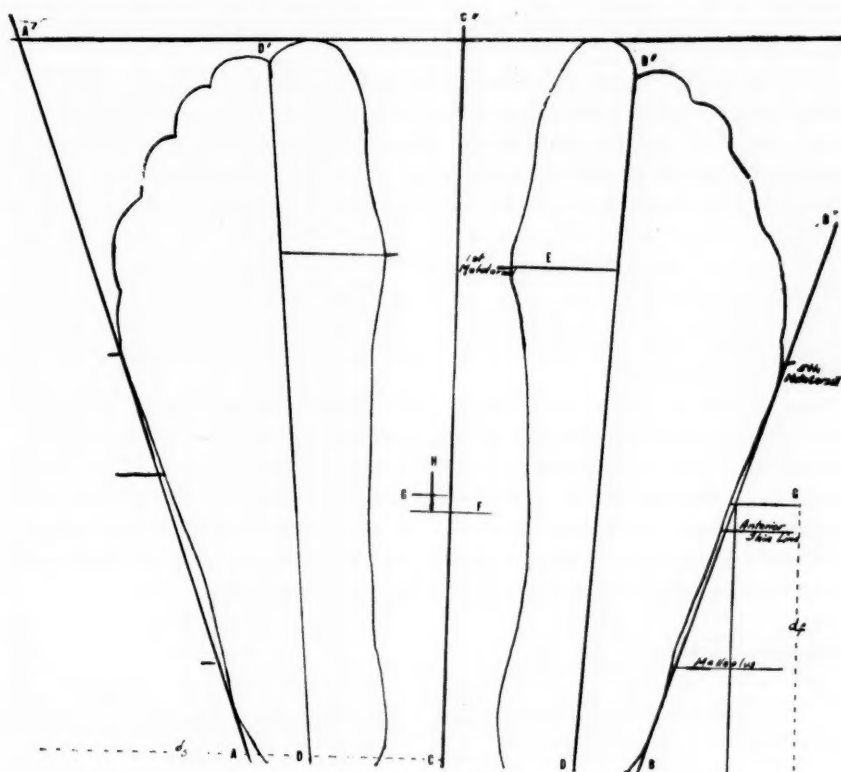


FIGURE II. AA' and BB' connect the most lateral parts of the feet at the heel and at the metatarsal region.

A'B' connects the most anterior points of the feet.

CC' is the geometric vertical line and is erected by bisecting the area between the outside borders of the feet.

DD' connects the midpoints of the heels and the space between the first and second phalanges.

E is erected at right angles to DD' which marks the distal end of the first metatarsal.

F is a line perpendicular to CC'. It is a bisection of the distance ED. The point where F bisects CC' is the geometric center of the base of support.

The line d_1 is measured forward from the posterior edge of the paper and is the distance obtained from the formula for locating the frontal plane.

The line d_2 is measured from the left side of the paper and is the distance obtained from the formula for locating the sagittal plane.

G is the line representing the frontal plane while H is the line representing the sagittal plane.

The point where G and H intersect is the point at which the center of gravity is projected downward through the base of support.

designated as the center of gravity. S equals the partial weight of the subject and board and B equals the partial weight of the board while T equals the total weight of the subject and L equals the length of the board. Weight was measured in pounds and length in centimeters.

The heel board in the photograph was clearly visible so that it could be pricked with a needle and used as a reference point. It was possible to locate the gravital line on the picture by means of proportional measurements. Knowing the actual distance from the heel board to the individual's line of gravity, which was obtained from computations and the actual length of the board, and knowing the distance on the picture from the heel board to the end of the board, it was possible to find the distance on the picture from the heel board to the line of gravity. Using a plumb line which had been hung in the picture as a line of reference, the line of gravity was projected upward on each photograph. Measurements on the photographs were made to the nearest half millimeter.

With the line of gravity established as described, a study could be made of where it fell in each body segment. Observations were made of the placement of the line of gravity in relation to the following landmarks: the ankle joint, the anterior border of the tibia just above the ankle, the knee joint, the acromio-clavicular joint and the ear. With the exception of the ankle joint, no attempt was made to measure exactly where the line crossed the landmark but rather the relationship of the line to the part involved.

Analysis of Data

TABLE 1
Distance of Line of Gravity from Landmarks at the Ankle Joint

| Measure | Number of Students | Mean | Standard Deviation | Range |
|--|--------------------|----------|--------------------|--------------|
| Line of gravity to posterior border of heel | 66 | 9.03 cm. | 1.52 cm. | 5.0-12.8 cm. |
| Line of gravity to posterior border of lateral malleolus | 66 | 5.36 cm. | 1.49 cm. | 1.35-9.7 cm. |
| Line of gravity to anterior border of tibia at ankle joint | 66 | 0.95 cm. | 1.39 cm. | 3.1-3.75 cm. |

With a much larger number of subjects, Hellebrandt (4) obtained nearly the same measurements for the line of gravity in relation to the lateral malleolus as obtained in this study. Her measurement for major students in physical education was 5.65 cm. and for non-major students, 4.928 cm. As she does not mention the exact part of the malleolus taken as a reference point, the discrepancy between this study and her study may be due to a slightly different portion of the malleolus being selected as a reference point.

Originally this study was undertaken to see if the anterior border of the tibia could be used as a rough approximation of where the line of gravity fell at the ankle joint. As this reference point was found by the authors to be

only 0.95 cm. from the mean found for the line of gravity at the ankle, the anterior border of the tibia could be used as a rough approximation of where the center of gravity falls in the ankle for most individuals. In 84 per cent of the cases, the line of gravity was anterior to the anterior border of the tibia but on the average less than a centimeter from it. There is no evidence that it falls through the ankle joint proper nor even near it in the majority of cases. Nine of the authors cited in the literature described the line of gravity in a similar position to that found in this investigation but three described or used illustrations showing the line of gravity passing through the ankle joint proper.

There is just as much variation in description of the placement of the line of gravity in the knee as in the ankle joint. Eight of the authors cited in the review of literature placed the line of gravity in agreement with the findings for the majority of the cases as shown in Table 2. Two of the authors described other locations such as through the center of the joint surface.

Because of the difficulty of photographing no attempt was made to locate the hip joint so no comparison can be made with what is described as the usual placement of the line of gravity in relation to the hip joint.

TABLE 2
Location of Line of Gravity with Respect to Knee Joint

| Location | Total | | Normal | | Sway Back | | Pelvic Tilt | | Forward Head | |
|--|-------|-----|--------|-----|-----------|-----|-------------|-----|--------------|-----|
| | N | % | N | % | N | % | N | % | N | % |
| Distribution of group | 65 | 100 | 40 | 61 | 7 | 11 | 8 | 12 | 10 | 16 |
| Anterior to joint (through patella) | 29 | 45 | 17 | 43 | 2 | 29 | 3 | 38 | 7 | 70 |
| Through anterior portion of joint surface | 21 | 32 | 13 | 32 | 2 | 29 | 5 | 62 | 1 | 10 |
| Through middle of joint surface | 13 | 20 | 9 | 23 | 3 | 42 | 0 | 0 | 1 | 10 |
| Through posterior portion of joint surface | 2 | 3 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 10 |
| Total | 65 | 100 | 40 | 100 | 7 | 100 | 8 | 100 | 10 | 100 |

The cases were unselected as to erectness of the body so one would expect to find a variation in the placement of the line of gravity in relation to the shoulder. The statement that most authors make is that the line of gravity for a good shoulder position should run through the acromion process without being more specific. Sixty-two per cent of these unselected posture cases fell in that category, so it seems to be a reasonable landmark.

TABLE 3
Location of Line of Gravity with Respect to Acromio-Clavicular Joint

| Location | Total | | Normal | | Sway Back | | Pelvic Tilt | | Forward Head | |
|--|-------|-----|--------|-----|-----------|-----|-------------|-----|--------------|-----|
| | N | % | N | % | N | % | N | % | N | % |
| Anterior to acromion process | 26 | 40 | 14 | 35 | 4 | 57 | 4 | 50 | 4 | 40 |
| Through anterior portion of acromion process | 24 | 36 | 15 | 38 | 2 | 29 | 2 | 25 | 5 | 50 |
| Through acromio-clavicular joint | 14 | 22 | 10 | 25 | 1 | 14 | 2 | 25 | 1 | 10 |
| Through posterior portion of acromion or posterior to it | 1 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 65 | 100 | 40 | 100 | 7 | 100 | 8 | 100 | 10 | 100 |

TABLE 4
Location of Line of Gravity with Respect to the Ear

| Location | Total | | Normal | | Sway Back | | Pelvic Tilt | | Forward Head | |
|-------------------------|-------|-----|--------|-----|-----------|-----|-------------|-----|--------------|-----|
| | N | % | N | % | N | % | N | % | N | % |
| Anterior to ear | 7 | 11 | 5 | 13 | 1 | 14 | 1 | 13 | 0 | 0 |
| Anterior aspect of lobe | 21 | 32 | 12 | 30 | 3 | 43 | 5 | 62 | 1 | 10 |
| Middle of ear | 10 | 16 | 8 | 20 | 2 | 29 | 0 | 0 | 0 | 0 |
| Posterior border of ear | 13 | 20 | 8 | 20 | 0 | 0 | 2 | 25 | 3 | 20 |
| Posterior to ear | 14 | 21 | 7 | 17 | 1 | 14 | 0 | 0 | 6 | 60 |
| Total | 65 | 100 | 40 | 100 | 7 | 100 | 8 | 100 | 10 | 100 |

The cases where the line of gravity ran posterior to the ear had a distinctly forward head position. It is interesting to note that five of the authors are in agreement that the line of gravity should run behind the ear or on line with the mastoid process. Only three placed the line of gravity as far forward as the lobe of the ear, yet in this study in 60 per cent of the cases the line of gravity fell at the middle of the ear or anterior to it. These were for the most part in well-balanced body alignment without overhang or sway back. It is possible that this landmark should be investigated further for its exact placement.

Summary

The line of gravity at the ankle joint was found to lie anterior to the center of the ankle joint. For a rough approximation, the line of gravity runs close enough (0.95 cm.) to the anterior border of the tibia to be considered on line with it. More study needs to be done of the relation of the gravitational line to specific landmarks on the ear.

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Health Education as a Requirement for Certification of Secondary School Teachers

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Abstract

This study is a continuation of an investigation begun in 1949 and discloses the changes in health education requirements for the certification of secondary school teachers between October 1951 and October 1953. These changes include the extent of health education as a requirement in general education, professional education, and in the special fields for certification of secondary school teachers in the 48 states and in the District of Columbia and the health education differences as certification requirements among the states.

OVER A PERIOD OF 30 years, leaders in health education, physical education, school administration, medicine, nursing, and public health have endeavored to obtain health education as a partial requirement for the certification of secondary school teachers. Health education, as a requirement for certification, was and is occasionally mentioned either in the general education, professional education, or the special field of the candidate's preparation which is evaluated by state certifying agencies in order for the candidate to receive a teaching certificate. In this evaluation of the candidate's preparation, the candidate must have proof of minimum preparation in general education, professional education, and his specialized field, or pass an examination by the certifying agency. The recent graduate of the teacher education institution usually submits his college credentials to a state certifying agency for evaluation. In this evaluation, what health education requirements are necessary for the certification of secondary school teachers in academic fields, physical education, health and physical education, and school health education?

This question is a timely one since the Committee for the Improvement of Professional Preparation in Health Education, Physical Education, and Recreation; the American Association of Colleges for Teacher Education; and the National Council for Accreditation of Teacher Education have encouraged teacher education institutions to improve their professional curricula in school health education. This improvement of the professional curricula should have and has had some influence upon teacher certification requirements.

Unfortunately, during the past 30 years, there have been only a few investigations which have included health education as a requirement for the certification of secondary school teachers. In May 1952, an article published in the *Research Quarterly* (1) revealed the health education requirements

necessary for the certification of secondary school teachers in academic fields, physical education, health and physical education, and school health education in the 48 states and the District of Columbia between October 1949 and October 1951. This study has been continued to disclose the changes in health education requirements for the certification of secondary school teachers between October 1951 and October 1953. Cities with special certification requirements were not included.

Purposes and Methods

This study had two purposes: (1) to determine the extent of health education as a requirement in general education, professional education, and in the special fields for certification of secondary school teachers throughout the United States; and (2) to find and to analyze the health education differences as certification requirements among the states. In both 1951 and 1953, certification requirements issued by state certifying agencies were analyzed, checked, and a compilation of general education, professional education, and special certification requirements resulted.

Review of Literature

Health education, as a part of the secondary school teacher's preparation and as a requirement for certification, has been repeatedly stated in publications since 1924. These publications were mentioned in the *Research Quarterly* article of May 1952 (1).

In May 1948, the National Conference on Undergraduate Professional Preparation in Health Education, Physical Education, and Recreation (Jackson's Mill) recommended competencies and learning experiences in the functions of school health educators in health instruction, in the program for healthful school living, and in school health services plus health education for all teachers (7). Later in November 1949, the Conference on the Undergraduate Professional Preparation of Students Majoring in Health Education, sponsored by the United States Office of Education, made additional suggestions to the preparation and functions of the school health educator as given at the May 1948 (Jackson's Mill) conference (3).

To give further impetus to improving the professional curricula, the Executive and Implementation Committees of the National Conference on Graduate Study in Health Education, Physical Education, and Recreation (Père Marquette) and the National Conference on Undergraduate Professional Preparation in Health Education, Physical Education, and Recreation (Jackson's Mill) were merged at the April 1950 (Dallas) convention of the American Association for Health, Physical Education, and Recreation into a Continuing Committee. This Continuing Committee had the task of selecting a name, preparing an operating code, and devising schedules and evaluation criteria for professional preparation in health education, in co-operation with the American Association of Colleges for Teacher Education (8). In April 1951, the Committee for the Improvement of Professional Preparation in Health Education, Physical Education, and Recreation was named (2).

One month previous to the naming of this new committee, the National Conference for the Mobilization of Health Education, Physical Education, and Recreation was held. Some of the highlights of the health education report were: (1) teachers and other school personnel should understand their responsibilities in the school health program; (2) school health educators should have a preparation comparable with the preparation of teachers in other teaching fields; (3) colleges and universities should provide opportunities for the preparation of health administrators, coordinators, and counselors (6).

The Committee for the Improvement of Professional Preparation in Health Education, Physical Education, and Recreation held its first official meeting in April 1952 and at that time stated its purpose: To improve the undergraduate professional preparation of prospective teachers of health education and physical education and of recreation leaders (4). In order to carry out this purpose, the Committee and the American Association of Colleges for Teacher Education have developed tentative health education evaluation criteria.

Even though there are indications of improving the professional health education curriculums in teacher-education institutions, the acceptance of health education as a partial requirement for the certification of secondary school teachers still needs investigation. For it is upon these minimum certification requirements in health education that secondary school teachers are assigned health teaching. A study by Jennelle V. Moorehead of the transcripts of academic records of 307 Oregon high school health teachers (83 per cent of the Oregon high schools represented) showed there was a lack of correlation between the teachers' preparation and the teaching of health.

In another study and using the same teachers, the author found that Oregon teachers were not prepared to teach health, probably had no intention of teaching health during their college preparation, and in all likelihood were assigned health teaching by administrators to make for convenient scheduling. The author believed that a similar study in other states would reveal the same facts. Further, the author added that the lack of health education certification requirements has contributed to the inadequacies in the preparation for health teaching and has allowed school administrators to assign any high school teacher to health teaching (5).

Findings

The findings of this study are divided into four groups: (1) health education requirements for secondary school teachers in academic fields; (2) health education requirements as a part of the special requirements for persons certified to teach secondary school physical education; (3) health education requirements as a part of the special requirements for persons certified to teach secondary school health and physical education; (4) health education requirements for persons certified to teach secondary school health education.

I. Health Education Requirements for Secondary School Teachers in Academic Fields.

Sixteen states, in 1951, listed health education as a requirement fulfilling either general education, professional education, or the over-all pattern of certification. These states were Arizona, Arkansas, California, Florida, Illinois, Kentucky, Louisiana, Mississippi, Missouri, Nebraska, New Jersey, South Carolina, Utah, Virginia, Washington, and West Virginia (1).

In 1953, changes were given in the semester hour requirements and new states were added to the 1951 list. These changes in semester hour requirements involved the state of Florida.

Florida

1951—Health was listed as one of the areas to be met in the eight-semester-hour requirement of human adjustment, a subdivision of general preparation. This requirement was revised July 21, 1953.

1953—Health was listed as one of the areas to be met in the six-to-12-semester hour requirement of human adjustment, a subdivision of general preparation.

Two new states were added to the 1951 list of states.

Oklahoma

1951—No mention of health education.

1953—For the Standard Certificate, effective July 1, 1953, the candidate may choose health and physical education as one of six areas comprising general education which totals 50 semester hours.

Tennessee

1951—No mention of health education.

1953—Effective September 1, 1953, six semester hours in health, personal development, home or family living are required in the general education core totaling 40 semester hours. It is suggested that learning experiences in personal and community health be included.

II. Health Education as a Part of the Special Requirements for Persons Certified to Teach Secondary School Physical Education (See Table 1).

In 1951, 14 states included health education as a part of the special requirements for persons certified to teach secondary school physical education. These states were Arkansas, California, Colorado, Iowa, Kansas, Maryland, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, West Virginia, and Wisconsin (1). Changes in the 1953 health education requirements were evident in Arkansas, Iowa, Kansas, North Carolina, and Oklahoma.

Arkansas: The two semester hours of health and safety required in 1951 were changed to include two to three semester hours of health and safety in 1953.

Iowa: The total of physical education semester hours was raised from 20 in 1951 to 26 in 1953 with four semester hours in courses covering Principles of the School Health Program.

Kansas: In 1953, the total of physical education semester hours was reduced from 40 semester hours to 20 semester hours, with five semester hours required in health education.

North Carolina: This state certified persons to teach secondary school physical education in 1951. The total of semester hours in physical education was 30, of which four to seven semester hours were in health education. Courses or areas selected by the candidate were Materials and Methods of Health Education, Personal Hygiene, Public Health, School Health Education, Child Hygiene, and Immunology. By 1953, this state

| Rhode Island (Special Subject) | 1951 | Bachelor's | 24 | x | | xt | xt |
|---------------------------------|------|------------|-----|---|-----|----|----|
| South Carolina | 1953 | Bachelor's | 40 | x | | | |
| | 1951 | Bachelor's | 24 | x | 3-4 | xt | xt |
| | 1953 | Bachelor's | 24 | x | 3-4 | xt | xt |
| Tennessee | 1951 | Bachelor's | 14 | x | 6 | xt | xt |
| | 1953 | Bachelor's | 24 | x | 12 | x | x |
| Utah | 1951 | Bachelor's | 40 | x | 12 | | |
| 1) Composite Major | 1953 | Bachelor's | 40 | x | 12 | | |
| 2) Major and Minor | 1951 | Bachelor's | 20+ | x | | | |
| | 1953 | Bachelor's | 20+ | x | | | |
| Vermont (Professional Standard) | 1953 | Bachelor's | 36 | x | | | |
| Virginia | 1951 | Bachelor's | 24 | x | 8 | xt | xt |
| | 1953 | Bachelor's | 24 | x | 8 | xt | xt |

* Numbers Indicate Semester Hours.
+ Required.
+ Major.

certified persons to teach secondary school health and physical education. These requirements are reported on Table 1.

Oklahoma: In 1951, Oklahoma certified persons to teach secondary school physical education of which 24 of the total semester hours were in physical education. Of these 24 semester hours, two semester hours were in First Aid. On July 1, 1953, this state certified persons to teach secondary school health and physical education. These requirements are included in Table 1.

III. *Table 1 presents health education as a part of the special requirements for persons certified to teach secondary school health and physical education.*

IV. *Table 2 lists health education requirements for persons certified to teach secondary school health education.*

Summary

Health Education as a Requirement for Secondary School Teachers in Academic Fields.

1. In 1951, 16 states listed health education as a part of either the general education or professional education requirements. In 1953, two states were added to this list.

2. The range of semester hours in health education as a part of either the general or professional education was from two to three. The average health education requirement was 2.28 semester hours in 1953.

3. In 1953, health education had been accepted as a part of the general education requirement in 13 of the 18 states.

4. Sixteen states named either health, hygiene, or health education as a requirement but made no attempt to explain if Personal Hygiene, Community Health, or the School Health Program were acceptable to satisfy this requirement.

Health Education as a Part of the Special Requirements for Persons Certified to Teach Secondary School Physical Education.

1. In 1951, 14 states listed health education as a part of the special requirements. In 1953, 12 states listed health education as a part of the special requirements.

2. Of the 12 states, seven states gave total semester hour requirements in health education. The range of semester hours in health education of these seven states was two to 12. The average health requirement was 6.3 semester hours in 1953.

3. The following courses or areas have the greatest frequencies in the health education requirements among the 12 states:

| | |
|-----------------------------------|----------|
| First Aid | 4 states |
| Personal Hygiene | 3 states |
| Community Hygiene | 3 states |
| Physical Inspection | 3 states |
| Hygiene | 3 states |
| Methods of Health Education | 2 states |
| Safety Education | 2 states |

TABLE 2
Health Education Requirements for Persons Certified To Teach Secondary School Health Education

| State | Year | Degree | Total Semester Hours in Health Education | Health Education Courses or Areas Required of or Selected by the Candidate | | | | | | | | | | | | | | | | | | | | | | | | |
|---|------|--------------------------------|--|--|-----------------|-----------|------------------|-------------------|--|------------------|-------------------|-------|--------------------------|--------------|---------------|----------------------|-------------------------|------------------------|-----------|----------------------------------|----------------------------|------------|--------------------|----------------------|----------------------|-------------------------------------|------------------------------|------------|
| | | | | Mental Hygiene | Family Life Ed. | Nutrition | Personal Hygiene | Community Hygiene | Organ. Admin. Supervision of Sch. Health Program | Safety Education | Health Counseling | Foods | Maternal & Infant Health | Home Nursing | School Health | Occupational Hygiene | Prim. Meth. & Materials | Prob. Sec. Sch. Health | First Aid | Elem. & Sec. Sch. Health Program | Sch. & Com. Health Program | Evaluation | Curriculum Content | Prim. of Pub. Health | Environmental Health | Organ. & Admin. of Sch.-Com. Health | Communicable Disease Control | Sanitation |
| California (General Secondary Credential) | 1951 | Bachelor's + 30 graduate hours | 36 | x | x | x | xr | xr | x | | | | xr | x | | | | | | | | | | | | | | |
| | 1953 | Bachelor's + 30 graduate hours | 36 | x | x | x | xr | xr | x | | | | xr | x | | | | | | | | | | | | | | |
| Connecticut | 1951 | Bachelor's | 18 | | | | | | | | | | | | | | xr | | | | | | | | | | | |
| | 1953 | Bachelor's | 18 | | | | | | | | | | | | | | xr | | | | | | | | | | | |
| Florida | 1951 | Bachelor's | 30 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1953 | Bachelor's | 30 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Idaho (Standard High School) | 1951 | Bachelor's | 15 | x | x | x | xr | xr | x | x | x | | | | | | | | | | | | | | | | | |
| | 1953 | Bachelor's | 15 | x | x | x | xr | xr | x | x | x | | | | | | | | | | | | | | | | | |
| Illinois | 1951 | Bachelor's | 32 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1953 | Bachelor's | 32 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Indiana | 1951 | Bachelor's | 36 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1953 | Bachelor's | 36 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Kentucky | 1951 | Bachelor's | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1953 | Bachelor's | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Louisiana | 1951 | Bachelor's | 19 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1953 | Bachelor's | 19 | | | | | | | | | | | | | | | | | | | | | | | | | |
| New Jersey | 1951 | Bachelor's | 48 | xr | xr | xr | xr | xr | 2* _r | xr | xr | xr | xr | | xr | xr | | | | | | | | | | | | |
| | 1953 | Bachelor's | 48 | xr | xr | xr | xr | xr | xr | xr | xr | xr | xr | | xr | xr | | | | | | | | | | | | |
| New York (Provisional Special Subject) | 1951 | Bachelor's | 36 | x | xr | x | x | x | xr | xr | xr | xr | x | xr | x | xr | xr | xr | x | x | | | | | | | | |
| | 1953 | Bachelor's | 36 | x | xr | x | x | x | xr | xr | xr | xr | x | xr | x | xr | xr | xr | x | x | | | | | | | | |
| North Carolina | 1951 | Bachelor's | 24 | xr | xr | xr | xr | xr | xr | xr | xr | xr | xr | | xr | xr | | | | | | | | | | | | |
| | 1953 | Bachelor's | 24 | xr | xr | xr | xr | xr | xr | xr | xr | xr | xr | | xr | xr | | | | | | | | | | | | |
| Tennessee | 1951 | Bachelor's | 16 | x | x | x | x | x | x | x | | | | | | | | | | | | | | | | | | |
| | 1953 | Bachelor's | 16 | x | x | x | x | x | x | x | | | | | | | | | | | | | | | | | | |

* Numbers indicate semester hours.
r Required.

4. States having noticeable changes in the 1953 requirements for the certification of secondary school teachers of physical education were Arkansas, Iowa, and Kansas.

Health Education as a Part of the Special Requirements for Persons Certified to Teach School Health and Physical Education.

1. In 1951, 11 states listed health education as a part of the special requirements. In 1953, seven states were added to this list.

2. Of the 18 states, 11 states gave total semester hour requirements in health education. The range of semester hours in health education of these eleven states was three to 22.5. The average health education requirement was 9.74 semester hours in 1953.

3. The following courses or areas have the greatest frequencies in the health education requirements among the 18 states:

| | |
|-------------------------|----------|
| First Aid | 7 states |
| Safety Education | 6 states |
| Personal Hygiene | 3 states |
| Community Hygiene | 3 states |

4. Since 1951, the following seven states have combined health education with physical education: Delaware, Georgia, Kentucky, North Carolina, Oklahoma, Oregon and Vermont.

5. The 1953 health education requirements for secondary school teachers of health and physical education have been changed considerably in Louisiana, Rhode Island, and Tennessee.

Health Education Requirements for Persons Certified to Teach Secondary School Health Education.

1. In 1951, eight states certified persons to teach secondary school health education. In 1953, three states were added to this list. One of the states listed in 1951 did not include 1953 requirements for persons certified to teach secondary school health education.

2. Of the ten states, the range of semester hours in the total health education requirements was 15 to 40. The average health education requirement was 25.8 semester hours in 1953.

3. The following courses or areas have the greatest frequencies in the health education requirements among the ten states:

| | |
|--|----------|
| Safety Education | 7 states |
| First Aid | 6 states |
| Personal Hygiene | 6 states |
| Mental Hygiene | 6 states |
| Family Life Education | 6 states |
| Nutrition | 5 states |
| Organization, Administration, and Supervision of the School Health Program | 5 states |
| Principles, Methods, and Materials of Health Education | 5 states |
| Community Hygiene | 4 states |

4. Since 1951, the following states have provided certification requirements for secondary school teachers of health education: Louisiana, North Carolina, and Tennessee.

Conclusions

1. There is a definite trend by state certifying agencies to include health education as a part of either the general education or professional education requirements of secondary school teachers. Eighteen states had this requirement in 1953, as compared with 16 states in 1951. Of the 18 states, 13 states accepted health education as a part of general education. The average health education requirement was 2.28 semester hours in 1953.

2. Health education as a part of the special requirements for persons certified to teach secondary school physical education has had only a few changes since 1951. These changes were noticeable in Arkansas, Iowa, and Kansas. The average health education requirement was 6.3 semester hours in 1953 as compared with 5.3 semester hours in 1951.

3. In 1953, 18 states included health education as a requirement for the certification of secondary school teachers of health and physical education. Eleven of 18 states have given definite semester hour requirements in health education. The average health education requirement was 9.74 semester hours in 1953. Since 1951, seven states have combined health education with physical education. The average health education requirement in semester hours has remained the same since 1951.

4. It was encouraging to note that a total of ten states in 1953 certified persons to teach secondary school health education as compared with a total of eight states in 1951. The average health education requirement was 25.8 semester hours in 1953. In 1951, the average health education requirement was 28 semester hours. In 1953, Safety Education was the area required of or selected by the candidate with the greatest frequency. Louisiana, North Carolina, and Tennessee were added to the list of states certifying persons to teach secondary school health education.

5. There was a marked consistency in the health education requirements among secondary school teachers of physical education, health and physical education, and school health education to include First Aid as a course or area required of or selected by the candidate. First Aid appeared with the greatest frequency in the physical education and health and physical education requirements and was ranked second in frequencies in the 1953 school health education requirements.

6. In 1953, there were 12 states and the District of Columbia which certified persons to teach secondary school physical education but made no mention of health education requirements for secondary school teachers of academic fields or of physical education.

7. There was a definite indication that health education was included as a requirement for the certification of secondary school teachers in academic fields, physical education, health and physical education, and school health

education when the 1953 certification requirements of the 48 states and the District of Columbia were compared with the 1951 certification requirements.

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Racial Differences in the Influence of Motivation on Muscular Tension, Reaction Time, and Speed of Movement¹

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Abstract

Improvement in speed of reaction and movement was motivated in 30 Negro and White boys (age 12-14 yrs.) by a loud sound which signaled slow responses. There were no racial differences before motivation. White boys improved 8% in *RT* and 18% in *MT*; Negro boys 5% in *RT* and 17 % in *MT* (compared with control groups). Improvement in Negro speed was extremely variable and not statistically significant; it was negatively correlated ($r = -0.63$) with change in tension measured by the pneumatic bulb technique. Improvement in White speed was significant and positively correlated with tension ($r = 0.42$). White tension increased under motivation. *RT* and *MT* showed low intercorrelations ($r = 0.23$ and 0.38).

THE EFFECTS OF motivation on the results of various tests and performances (both mental and physical) are well known to coaches, teachers, and experimenters (20). There are several ways in which a motivator can act—it may have a general facilitative or energizing effect, and can in addition function as a directing influence, involving either positive or negative incentives (19). Most research on the topic has been concerned with the relation of motivation to learning. It has been found, however, that even a basic unlearned response such as is observed in reaction-time experiments is improved by motivation. The effect of the motivation (i.e., the faster response) is not only retained after the original motivating agent is discontinued, but may even show transfer to a different activity that is not itself directly subjected to the motivating agent.

Review of Literature

Motivation. The first account of improvement in reaction time due to motivation was given by Johansen in 1922 (11). Henry confirmed these results with statistical proof, and went on to establish that motivated improvement in a relatively simple response showed acceptable evidence of transfer to a more complicated co-ordination (8). Munro found that this transfer of quicker action due to motivation was retained by the subjects for as long as seven weeks before it retrogressed significantly toward the initial speed of movement (16).

¹From the Research Laboratory of the Department of Physical Education, University of California, Berkeley. The writer is indebted to Dr. Franklin M. Henry for advice during the course of this investigation.

One aspect of motivation studied by Henry (8, 9) and more recently by Howell (10) was described by them as "informational motivation." By this was meant that motivation was rendered more effective when the subjects were informed as to whether their times (in a reaction-time test for example) were faster or slower than their own average. This information was in some of the experiments made an implicit part of the motivating agent (electric shock, bright light, or noise) which was set by an electric time controller to commence at average response time, so that it was applied to the subject only during the responses that were slower than the subject's own average. It was shown by these authors that the *movement time* phase of a co-ordinated response was improved by either non-informational or informational motivation, but the *reaction-time* phase was improved only when the motivation was informational (9, 10). Comparing total-time scores in a series of co-ordinated movements, a psychologically "tense" group improved significantly more than a less tense group under the influence of informational motivation. Both groups also improved when the motivation was non-informational, but did not differ significantly in the amount of increase (10).

Muscular Tension. Freeman found that during reaction-time tests, the subjects had faster reactions when they were told to get their muscles into a state of slight tension than when they were just instructed to move as fast as they could (7). Davis, measuring the electric potentials in the muscles, found the correlation to be -0.42 between reaction time and absolute tension at the end of the foreperiod (5).

In regard to whether motivation influenced muscular tension, Stroud found that his subjects exhibited an increase in muscular tension during effortful activity such as tracing a maze (18). Freeman (7) observed, while testing effects of muscular tension on various performances, that tension of non-involved muscles was notably increased under conditions of "super-maximal effort." (The reward in this situation was a \$5.00 prize for the fastest subject). Woodworth stated that "tension depends on O's zeal, . . . even the expert may develop great muscular tension when he is trying for a record" (21, p. 158), and Bills inferred that muscular tension could be regarded as one of the important components of effort (1).

Racial Differences. Speculative attempts to discover racial differences which might give the Negro superiority of performance in the sprints and jumping (12) are legion, but controlled studies on racial differences in speed of simple movement are few.

Lambeth and Lanier in 1933 found that on the *Minnesota Speed of Movement Test* the two racial medians were practically identical (13), and Moore in 1941 found no statistical difference between the races in a speed test—putting colored marbles into appropriate rows (15). Many coaches comment that White boys are more likely to "tie up" in competition than Negroes. Stratton and Henry found that the Mongolian and Caucasian races differed in some of the physiological functions intimately connected with emotions

(17). Hence, the possibility of finding White-Negro differences in response to motivation suggests an interesting topic of investigation.

Hypotheses

One of the purposes of this study is to test the hypothesis that an increase in speed of reaction time and/or movement time due to informational motivation (as used in the Henry studies) is accompanied by a rise in muscular tension. The writer, as an enthusiastic track participant, is well aware of the high tension that is prevalent before a race. It is possible that increased tension could be one of the mechanisms responsible for the faster reaction that results from motivation.

A second purpose is to discover whether any racial differences between Whites and Negroes are present in reaction time and/or movement time, in muscular tension, and particularly if there are changes in these responses which can be ascribed to differences in the effectiveness of "informational" motivation. The Stratton and Henry study (17) suggests that there should be racial differences.

Methodology

Apparatus. Informational motivation (information and presumably motivation) was provided by an electrical sound source attached to the reaction apparatus in such a way that it commenced buzzing at some specified interval after the stimulus light appeared. During the second half of the study, each subject of the experimental group was told that the buzzer was set to deliver a sound whenever the responses were slower than the average of the last ten trials of the first half of the study. This meant that if a subject performed better than previously, he would automatically disconnect the timing apparatus before the sound appeared, and so would not be buzzed. However, if the response speed was just average, or poorer, the buzz would begin and last until the response was completed. The motivation was considered to be informational because the buzzer served to inform the subject, during the response, as to whether it was faster or slower than his own average. The buzzing noise, which was quite loud, was conducted to the subject by means of earphones.

The equipment for measuring the reaction and movement times, and for producing the sound, has been described by Henry (9). A diagram and explanation has also been given by Howell (10). Therefore, only a brief explanation of the apparatus and the specific way it was used in this experiment is necessary.

The subject held the reaction key down with the metal end of a thin-walled pneumatic bulb (an atomizer bulb) which he held in his hand. (The function of this bulb was to measure tension, as will be explained later.) He was instructed to keep looking at two lights on the instrument. Dim lighting of the light on the left was the signal for "get set"; within one to four seconds later the light on the right was caused to flash brightly as the signal to react. At the latter signal, which started the chronographs, the subject moved his hand

(with the pneumatic bulb in it) forward as rapidly as possible to strike down the treadle with the end of the bulb, thus operating the switch which disconnected the "total-time" chronograph and the noise circuit. The adjustable time-delay circuit that turned on the noise was started automatically when the bright reaction light flashed on. The very first movement of the subject's hand stopped the "reaction-time" chronograph.

A light-weight rubber tube led from the pneumatic bulb to a metal tambour which operated a recording pen on a chronograph tape. After each response, the subject (S) placed the bulb on the table for three to four seconds. At this time, the tension-recording line would smooth out into a steady straight line from which a new base line would be projected for the ensuing response. The distance the pen would leave this base line when S held the bulb was measured in millimeters, and this was used as the measure of tension.

Davis has criticized the use of the pneumatic bulb for measuring tension on the grounds that "theoretically there could be a high state of tension, equal in both [flexors and extensors] which would be recorded as zero" (4). The writer hoped to avoid this pitfall by measuring the tension as S picked up the pneumatic bulb, adjusted it in his hand, placed its end on the reaction key, and waited for the stimulus. There was a period of three to five seconds duration when the flexors were definitely the dominant muscles. According to Sherrington's principles of inhibition, when a group of muscles contract, their antagonists undergo an actual inhibition in which they have "less tone than is present in the normal resting state" (2, p. 53). It would therefore seem that while S was adjusting the bulb there would be moments when the extensors could not possibly counteract the tension in the flexors, and at these times any superfluous tension (i.e., tension which was more than that needed to hold the bulb) could be measured and might be indicative of the state of muscular tension within the individual.

During a pilot study, the writer recorded three points of tension: *H* tension represented the highest point made as the subject adjusted the bulb prior to the preparatory period, *P*₁ represented the midpoint of the preparatory period, and *P*₂ tension represented the tension at the end of the preparatory period. The *H* tension (the highest tension) seemed to be the best measure and has been used in this study.

Subjects. The 60 Ss were 8th grade pupils (male). Half were Negroes, and the remainder were of the White race, with half of each racial group being in the motivated or "experimental" group. The control and experimental groups were matched according to age and race (14). The age range was from 12 years eight months to 14 years four months, with the mean being 13 years seven months. Orientals, Mexicans, and light-colored Negroes were excluded. No subject had been previously tested in *RT*, and none knew that motivation or racial differences were being studied.

Experimental Design. All Ss were tested for 80 trials. They were given a 20-second break at the end of the 20th and 60th trials, and a one-minute break at the end of trial 40, at which time motivation of the experimental group

was started. The pressure for the first half of the experiment was recorded from trials 21 to 40. The measurements for the first 20 trials were omitted in order to avoid the higher tension that is present at the beginning of a learning situation as has been demonstrated by Stroud (18). This was an attempt to separate the tension caused by effort from the tension while learning. In the second half of the experiment, the tension was recorded for all 40 reactions. The preparatory period varied in length from one- to four-second periods, and the sequence followed a predetermined randomized schedule. All of the testing was done in the morning.

Test Instructions and Procedure. The signal lights were explained by the experimenter (*E*), who then demonstrated the motion once or twice. The similarity between the test and the starting of a track race was mentioned. It was hoped that resemblance to an athletic performance would help to interest the boys. It was stressed that the experiment was being conducted so as to determine the reaction time of junior high school boys, and that their over-all average was more important than one or two extra fast reactions. Each *S* was given practice trials until he could react to the correct signal. This usually took two or three trials.

The control group was then given 80 trials. The members of the experimental group were introduced to the informational motivation at the end of the 40th response. At this point, *S* put on earphones and was told that he would be buzzed on the reactions which were slower than his own average time. The "track" analogy was again used in the explanation.

Experimental Results

Pre-Motivation Racial Comparison. The means for reaction time (*RT*), movement time (*MT*), and total time (*TT*), during the first 40 reactions, were determined for all *Ss*. The responses for the 30 Whites and 30 Negroes under these pre-motivational conditions were compared. No significant differences were found, as can be seen in Table 1. (For 29 degrees of freedom, a *t* ratio

TABLE 1
Pre-Motivation Comparison of the Two Racial Groups
(In all tables, the original calculations were
carried out to one additional decimal place)

| N = 30 for each race | M | S.D. | Diff. | t-ratio |
|-----------------------------|-------|-------|-------|---------|
| Reaction Time (Sec.) | | | | |
| White | 0.244 | 0.042 | 0.004 | 0.37 |
| Negro | 0.240 | 0.041 | | |
| Movement Time (Sec.) | | | | |
| White | 0.105 | 0.041 | 0.019 | 1.65 |
| Negro | 0.124 | 0.050 | | |
| Total Time (Sec.) | | | | |
| White | 0.350 | 0.075 | 0.014 | 0.71 |
| Negro | 0.364 | 0.071 | | |
| Tension (mm.) | | | | |
| White | 7.08 | 13.4 | 3.31 | 1.05 |
| Negro | 10.39 | 11.1 | | |

of 2.05 is required for the difference to be significant at the 5-per-cent level of confidence). The highest t ratio was for MT and it was only 1.65.

The tension measurements taken during the pre-motivation part of the experiment were dealt with in the same way, and are also given in Table 1. Though the mean tension for Negroes was 10.39 mm. as opposed to a mean of 7.08 mm. for Whites, the variance within each race was so great that the difference between the races had a t ratio of only 1.05. A chi-square test using a two-by-two table divided at the medians was worked out as a check and found to be 1.74. (A chi square of 3.84 is needed to be significant at the 5-per-cent level of confidence).

Effect of Motivation. Differences began to appear when the *changes* in RT , MT , and TT , and muscular tension due to motivation were compared, as between the experimental and control groups. Table 2 shows these changes.

TABLE 2
Improvement Scores Resulting from Motivation
(Scores are in seconds for time, and in per cent for tension. A negative sign means decline in tension or increase in time score.)

| N = 15 for each group | Controls | | Experimentals | | Difference Exp.-Cont. | t -ratio Exp.-Cont. |
|--------------------------|----------|-------|---------------|-------|--------------------------|--------------------------|
| | M | S.D. | M | S.D. | | |
| <i>Negro</i> | | | | | | |
| RT | 0.000 | 0.022 | 0.020 | 0.015 | 0.020 | 2.86 |
| MT | 0.003 | 0.024 | 0.021 | 0.022 | 0.019 | 2.16 |
| TT | 0.006 | 0.017 | 0.046 | 0.027 | 0.040 | 4.74 |
| Tension | -3.92 | 43.3 | 32.14 | 43.6 | 36.06 | 2.20 |
| <i>Negro</i> | | | | | | |
| RT | -0.006 | 0.022 | 0.007 | 0.035 | 0.013 | 1.11 |
| MT | 0.015 | 0.027 | 0.036 | 0.034 | 0.021 | 1.82 |
| TT | 0.008 | 0.029 | 0.042 | 0.057 | 0.034 | 2.03 |
| Tension | -14.89 | 35.4 | 14.13 | 59.5 | 29.02 | 1.57 |

The White experimental group, after motivation, showed significantly more improvement than the White control group in all three measures of speed. (For 14 degrees of freedom a t -ratio of 2.98 is significant at the 1-per-cent level of confidence, and a t -ratio of 2.14 is significant at the 5-per-cent level of confidence).

The Negro experimental group did *not* have clearly significant improvements in any movement; the t -ratios are all too small. The standard deviations given in Table 2 show that the Negro experimental group was nearly twice as variable as the Negro control group in TT improvement ($F = 3.86$, which is significant at the 1-per-cent level), whereas the White experimental group was not significantly more variable than the White control. The *net amount* of improvement in RT was much less for the Negroes, but in MT was slightly more (non-significant).

There was greater variability of the improvement due to motivation, in the Negroes compared with the Whites. The F -ratio for the variances was 5.44 for RT and 4.55 for TT . (Both of these are significant above the 1-per-cent

level). The ratio for *MT* variances was not significant because *F* is 2.38. Before motivation, the two racial groups did not differ in variance (Table 1). The amount of improvement was as large for Negroes as for Whites, but not statistically significant for them because the individuals of their group were so variable in the amount of improvement.

Tension. The change in muscular tension was computed by determining a percentage score which gave the degree of tension in the motivation period in relation to the tension score of the pre-motivation period. For the Whites, the control group had six boys who increased tension and nine who lost tension, and the experimental group had 14 boys who gained tension and only one who lost. The *t*-ratio for the difference of the mean per cent scores was 2.20 (significant at the 5-per-cent level of confidence—Table 2). In the Negro group, the controls had four boys who gained tension and 11 who lost, and the experimental group had only five gain and ten lose tension. The *t*-ratio for the difference of the mean per cent scores was 1.57 (not significant). Here again, there was a difference between Whites and Negroes in regard to their response to motivation.

Correlational Analysis. There was practically no correlation between muscular tension and *TT* before motivation. An interesting thing to notice is that the correlation for the Whites was positive ($r = 0.045$) but the Negro correlation was negative ($r = -0.140$). Correlations between the increase in muscular tension and the improvement of speed for the experimental group showed that in the Whites there was a relation in the positive direction ($r = 0.42$), while in the Negroes the relationship was in the negative direction ($r = -0.63$). (For 14 degrees of freedom, an r of 0.497 is required to be significant at the 5-per-cent level of confidence and an r of 0.623 is required at the 1-per-cent level). The correlations between the increase in muscular tension and improvement in *TT* were less for the control group, but the directions taken were the same as for the experimental group. When the groups were combined, the correlation for the Whites was $r = 0.379$ and the correlation for the Negroes was $r = -0.496$ (both are statistically significant).

Discussion

According to the findings of this study, Henry's results on the improvement in speed of an unlearned co-ordinated movement, due to informational motivation, are confirmed for the White boys; both *RT* and *TT* are made faster. As in Howell's experiment (10), the percentage of improvement is approximately 2.5 times as large for *HT* as for *RT*. Howell, however, found a greater increase (60%) which may be because he used a strong electric shock instead of just a sound, in order to produce the motivation. Even so, the *MT* of the White boys speeded up 18 per cent in this experiment. While the *MT* of Negro boys improved nearly as much (17%), the change was not statistically significant, and their improvement in *RT* was only 5 per cent. The average tension score for the Negroes increased only 13 per cent and was not significant; for the White boys it increased 45 per cent and was

significant. The two groups did not differ significantly from each other in the pre-motivational comparison, so it seems that there are racial differences.

Fairclough, when studying transfer of motivated improvement (6), found a low negative correlation ($r = -0.278$) between *RT* and *MT*. That is, the boys who improve in *RT* tend to slow up in *MT*, and vice versa. In the present study a low negative correlation ($r = -0.22$) was found for the Whites, but in the case of the Negroes the correlation was positive ($r = 0.36$).

Henry (9) reported correlations from -0.07 to $+0.15$ between *RT* and *MT*. In the present study, before motivation, there was a low positive correlation between *RT* and *MT*; $r = 0.23$ for the Negroes (not significant), and $r = 0.38$ for the Whites (possibly significant).

The White boys seem to have responded to the incentive conditions more uniformly and effectively than the Negroes, and are characterized by a positive correlation between increase in tension and amount of improvement in speed of response. The Negroes do not seem to have reacted in that manner. The individuals with the greatest increase in tension tended to have the least improvement in speed of response, so the Negroes are characterized by a negative correlation. Compared with the Whites, the Negroes are also characterized by great individual variation in response to the experimental conditions.

Perhaps one of the reasons boys "tie up" under the stress of competition is that high motivation causes their general muscular tenseness to increase, causing their speed of *RT* and *MT* to increase just enough to throw their timing off a little. An example of this might be found in baseball. If the batter was using the same cues to begin his swing in a big game that he used in practice, he might find that his bat would reach the "point of contact" before the ball arrived.

A number of coaches consulted by the writer are of the opinion that Negro boys are typically less "tense" and more relaxed than White boys. Racial differences in muscular and other responses to an emotionally charged situation have been observed by others (17). In this experiment, they were not any less tense than the Whites at the beginning. They did show less increase in tension during the experiment but the striking difference is their more variable pattern of response.

One reason which might be suggested in explanation of the Negroes' less consistent increase in speed of *RT* or *MT* might come from Allison Davis's study in which he attributes a lack of "anxiety to get things done" in children of the lower socio-economic group, because these children are unable to realize the "rewards at the end of the anxiety laden climb" (3, p. 208.) This explanation would seem invalid for answering the questions which are raised in this study, since the boys believed they were being tested in an athletic skill. In the world of sports, events have proved that there are certainly enough Negroes at the top to guarantee the "rewards of effort" to any Negro boy who has what it takes.

Summary and Conclusions

Sixty boys, aged 12 to 14 years, were tested for speed of motor response in a laboratory situation. There were equal numbers of Whites and Negroes in the control and experimental groups. Muscular tension was measured by the pneumatic bulb technique. During the second half of the test, the experimental group was subjected to informational motivation produced by a loud sound that came on at the average individual response time and continued until the response was completed, thus emphasizing to the subject the fact that he had made a slow response.

The results showed no statistically significant differences between the Whites and Negroes in reaction time, movement time, or muscular tension during the first and unmotivated part of the experiment. The White experimental (motivated) group showed a significant improvement over the White control group in reaction time, movement time, and total time, and had a larger increase in muscular tension. While the Negro experimental group also improved, there was no clearly significant change in any of the above functions compared with the Negro control group. Using a one-tailed t distribution, their improvement in net movement time would be considered significant.

In both racial groups, the percentage improvement due to motivation was 2.5 to 3 times greater for net movement time than it was for reaction time. There was a low positive correlation between pre-motivated reaction and movement times, $r = 0.23$ for Negroes (not significant) and $r = 0.38$ for Whites (possibly significant).

The hypothesis that an increase in speed of reaction time and/or movement time due to informational motivation would be accompanied by a rise in muscular tension was confirmed for the Whites, but the results were inconclusive for the Negroes since they failed to show a significant increase in tension.

Racial differences were present with respect to the influence of the motivating agent, since the Whites significantly increased their speed of response and their muscular tension while the Negroes did not. The differences were more consistent in reaction time than in movement time; in this measure the Negroes improved only half as much as the Whites under motivation. In movement time, the Negroes actually improved, with respect to mean score, slightly more than the Whites, but they also became more variable and the improvement was non-significant. There was a significantly greater variance in the Negro improvement (compared with the White improvement variance) in reaction time and total time, but not in net movement time. The Whites showed a positive correlation between increase in muscular tension and improvement in total time, while the Negroes showed a negative correlation.

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An Anthropometrical Study of Some Big Ten Varsity Wrestlers¹

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Abstract

Thirty-six varsity wrestlers from four Big Ten schools were given a comprehensive series of tests that evaluate the physique. The study sought to determine what the body types for wrestlers were sustained. On the basis of the data it was indicated that the types for wrestlers were substantiated. On the basis of the data it was indicated that the body type for the wrestlers studied was far different from the short-legged, bulky muscled, extreme mesomorphic physique considered ideal. The wrestlers tended toward being an ectomorphic-mesomorphic body type, possessing body type characteristics of an agility athlete.

THIS STUDY SEEKS to determine what the constitutional and anthropometrical characteristics are of some Big Ten varsity wrestlers. Further, it will compare these results with the same measures on average groups of young men and on other athletic groups. It will also seek to discover whether or not some of the prevalent beliefs about the body type of wrestlers are substantiated.

Methodology

The subjects used in this investigation consisted of 35 varsity wrestlers from four Big Ten schools. The work on the wrestlers was done as the teams came to the University of Illinois for dual wrestling meets.

Each subject was run through a series of tests that constitute a good battery of tests for evaluating the physique. With the exception of postural analysis, it included all the more important tests in such work. The tests included:

- (1) Somatotype picture
- (2) Somatotyping done in the flesh by Dr. T. K. Cureton
- (3) Vital capacity
- (4) Bone, muscle, fat analysis
- (5) Measurement of body proportions and ratios off photographs and extra measurements taken in the bone, muscle, fat analysis
- (6) Four item strength test including right grip, left grip, back lift, leg lift, and total proportional strength

Once the raw data was collected, the mean, standard deviation, and range for each measure was computed. These results were then compared to normal groups of young men and to other athletic groups in both standard and raw scores.

¹This study was made in partial fulfillment of the requirements for a Master's degree at the University of Illinois, School of Health, Physical Education, and Recreation, under the sponsorship of Dr. Thomas Kirk Cureton in 1953.

To check the reliability of measurement, three subjects were run through the whole series of tests once a day, six days in succession. The mean, standard deviation, standard error of the mean, and per cent error was computed for each measure. The measurement of errors showed that less than 3 per cent error occurred in all measurements except for the strength items. The per cent error ran from about 2 to about 8 per cent in the strength measures owing, to some degree at least, to the normal day to day fluctuation of strength.

Significance of the Problem

At the present time, there is considerable disagreement as to exactly what the ideal body type and proportion are for wrestlers. Kohlrausch (6, p. 129) and Arnold (1) state that the wrestler is characterized by brute strength attributes, by being massively muscled, short-legged, and a stationary type of athlete. Boardman (2, p. 32) contends the wrestler is built like weight lifters and football players with short necks, powerful shoulders, wide trunks, and short legs with great muscular strength. In fact, most of the literature seems to indicate that the wrestler is characterized by brute strength attributes.

On the other hand, a great many wrestling coaches in America believe that there is no specific body type that predominates in the wrestling world. These men place greater emphasis upon attitude, temperament, ambition, and a burning desire to excel in wrestling. Even further, some of the coaches point out that, as wrestling is organized, it provides an outlet for the athletic ambitions of boys of all sizes, weights, and body types.

Probably the main factor for this difference in opinion is that almost all the research work done on wrestlers has been done on European amateur wrestlers or on professional wrestlers. There are important differences between these types of wrestling and the type or style of wrestling as conducted in the colleges and universities of the United States. Eriksen (5, pp. 568-9) points this fact out in his discussion of the two styles of amateur wrestling. In Europe, the Greco-Roman style of wrestling in which the contestant is allowed only to take hold of his opponent's body above the waist is generally used. In the catch-as-catch-can style of wrestling, commonly used in America, the contestants are allowed to apply holds practically any place on the body including the legs.

The two contrasting types of wrestling and the different inherent body type requirements may be the cause for the discrepancies that exist concerning the body type of wrestlers.

Definition of Terms

The Sheldon-Stevens-Tucker somatotyping procedure was used. This procedure is based on the theory that the human physique is made up of a mixture of components rather than of separate types. Three components—*endomorph*, *mesomorph*, and *ectomorph*—are used as the basis for classifying the human physique. These components, according to Sheldon's theory, developed from the embryonic layers.

Endomorphy, which is always mentioned first, refers to relative predominance of soft roundness through the various regions of the body.

Mesomorphy, the second component, means relative predominance of muscle, bone, and connective tissue. The mesomorphic physique is normally hard, heavy, and rectangular in outline. Bone and muscle are prominent and the skin is made thick by a heavy underlying connective tissue.

Ectomorphy, the last component, means relative predominance of linearity and fragility.

Bone, muscle, fat analysis consists of a weight prediction formula developed by Cureton (3, pp. 331-347) based on external measurements of bone, muscle, and fat, the three main body tissues related to weight. The gross proportions of bone, muscle, and fat are studied from the point of view of symmetry.

Results

The results appear to differ with many of the popular conceptions about the ideal body type for wrestlers. The data indicate that the American collegiate wrestler's body type is very different from the body type of European Greco-Roman and professional wrestlers. This is probably due to the enormous differences between the style of wrestling as commonly practiced in the United States as contrasted with the European style of wrestling.

The belief that the body types of weight lifters and wrestlers were very similar was not substantiated. On the whole, the somatotype of the Big Ten wrestlers tended to be that of an agility athlete with an ectomorphic-mesomorph somatotype to the left of the center circle of the body type triangle toward the lean, frail, linear type but with good strength.

A summary of the basic anthropometrical measurements is included in Table 1 (p. 310).

Conclusions

1. According to the data, the average Big Ten wrestler as represented in this study is not characterized by a ponderous type of somatotype rating, but instead tends toward being an agility type athlete with an ectomorphic-mesomorph rating of 3-5-4.

2. By comparing the data with studies by Tappen (8) and Soini Pere (7) on championship weight lifters, and statements by Dr. Cureton on weight lifters (4, p. 43), it seems as if the wrestling type is sufficiently different from the weight lifting type to suppose the existence of different body types being characteristic of each sport.

3. The average Big Ten wrestler as represented in this study is not characterized by being an extreme mesomorph although he is above average in this measure (5.01).

4. A slightly below average trend in ectomorphy (3.823) was found.

5. A below-average trend was found in the endomorphic component (2.74).

TABLE 1
Summary of Results

| Measure | Mean |
|--|---------------------|
| Height | 68.8 inches |
| Weight | 160.3 pounds |
| R.P.I. | 12.867 |
| Chest Breadth | 11.36 inches |
| Ankle Girth | 8.46 inches |
| Chest Depth | 7.96 inches |
| Hip Width | 11.2 inches |
| Skeletal Index | 131.7 |
| Gluteal Girth | 34.55 inches |
| Calf Girth | 13.61 inches |
| Biceps | 12.27 inches |
| Thigh | 19.86 inches |
| Muscular Index | 134.6 |
| Cheeks (Fat mm.) | 14.34 mm. |
| Abdomen | 14.46 mm. |
| Hips | 14.91 mm. |
| Gluteals | 20.94 mm. |
| Front Thigh | 17.29 mm. |
| Rear Thigh | 17.29 mm. |
| Adipose Index | 152.20 |
| Residual Weight | 25.06 pounds |
| Shoulder Width | 15.85 inches |
| Chest Normal | 35.3 inches |
| Chest Deflated | 32.55 inches |
| Chest Inflated | 36.71 inches |
| Arm Span | 71.36 inches |
| Abdom. Girth | 29.36 inches |
| Vital Capacity | 313.27 cubic inches |
| V. C. Residual | 24.059 cubic inches |
| Strength: | |
| Right Grip | 122.6 pounds |
| Left Grip | 114.45 pounds |
| Back Lift | 429.1 pounds |
| Leg Lift | 540.4 pounds |
| Total Strength | 1190.0 pounds |
| Endomorphy | 2.74 |
| Mesomorphy | 5.01 |
| Ectomorphy | 3.823 |
| Height/Abdominal Thickness | 9.35 |
| Ht. \times 100/6 \times Transverse Chest | 103.64 |
| Leg Length/Trunk Length | 1.6979 |
| Crural Ratio | 1.191 |
| Arm Span/Height | 1.0373 |
| Upper Arm/Forearm | 1.189 |
| Bust Height/Height | .47076 |
| Shoulder Width/Hip Width | 1.4175 |

6. Contrary to previous beliefs, the average Big Ten wrestler as represented in this study is not characterized by a wide hip measure but instead averages 11.2 in. for this measure, fully one-half of an inch or ten standard scores below average.

7. The fat measurements indicate that the average Big Ten wrestler is either extremely low or low in all the fat measurements taken. This agrees with the subjective endomorphic component rating.

8. On the basis of chest depth (7.96 in. or at 61 s.s.), chest breadth (11.36 in. or at 58 s.s.), and normal chest girth measurements (35.3 in. or at 52 s.s.), the average Big Ten wrestler is not characterized by huge chest measurements since normal groups of young men exceed most of these measurements. Therefore, the contention that the average wrestler is characterized by a huge chest, including depth and breadth, does not seemingly apply to the average Big Ten wrestler.

9. In comparing the strength test items it was found that the average Big Ten wrestler is below average in his Left Grip (114.5 lb. or 4 s.s. below average), below average in his Right Grip (122.6 lb. or 5 s.s. below average), just average in the Leg Lift (540.2 lb. or at 52 s.s.), and above average in only one item, the Back Lift (429.1 lb. or 17 s.s. above average). These objective strength test items agree with the subjective mesomorphic component rating.

10. The average Big Ten wrestler had a better ratio of shoulder width/hip width than the best athletic group measured by Cureton in the 1948 Olympics. This ratio describes all-around athletic ability. Hence, the average Big Ten wrestler as represented in this study is even more superbly built for all-around performance than the best athletic group studied by Cureton in the 1948 Olympics. The average Big Ten wrestler's ratio was 1.42 or at 92 s.s. compared to 1.37 at 84 s.s. for the best previous athletic group, a group of 15 Danish gymnasts.

11. The two indices which describe linearity as opposed to ponderosity— $\text{Height} \times 100/6 \times \text{Transverse Chest Diameter}$ and $\text{Height}/\text{Abdominal Thickness}$ —stand at 20 s.s. and 5 s.s. above average, with ratios of 103.64 and 9.35 respectively. These two indices seem to find agreement with the ectomorphy rating (3.823) and the reciprocal of the ponderal index (12.867), since all indicate the trend is for average to above average linear (ectomorphic) characteristics.

12. The wrestling type is not characterized by a large Bust Height/Height ratio, but instead is fully 18 s.s. below average in this index with a ratio of .471.

13. In the agility and jumping aptitude ratios, the average Big Ten wrestler stands at 65 s.s. or 15 s.s. above average in both indices: Leg Length/Trunk Length (1.6979) and the Crural Ratio (1.191).

14. In the indices describing aptitude for putting and throwing weights, the average Big Ten wrestler stands at 10 s.s. above average in the Arm

Span/Height ratio (1.0373), and 10 s.s. above average in the Upper Arm/Forearm ratio also.

15. The mean weight residual of 25.06 lb. with a s.s. value of 92 or 93 indicates that the average Big Ten wrestler's tissues are much more compact and dense than the average individual or other athletic groups used for comparative purposes.

16. The mean measure for vital capacity was 313.29 cu. in. or at 61 s.s.—11 s.s. above average.

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Personality and Its Relationship to Success in Professional Baseball

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Abstract

The purpose of this study was to determine whether specific personality traits are associated with success in professional baseball. To determine this a "success" group of 49 major league players was compared to a "non-success" group of 64 minor league players. The Minnesota Multiphasic Personality Inventory and a biographical data sheet were employed. Results indicate that major league players are better able than minor league players to:

1. Apply their strong "drive" towards a definite objective by exercising self-discipline.
2. Adjust to occupations, as professional baseball, requiring social contact, or the ability to get along well with other people.
3. Exercise initiative.

THE PURPOSE OF this study was to determine whether specific personality traits are associated with success in professional baseball.¹

It has been estimated that approximately one out of every 383 boys who sign contracts to play professional baseball reaches the major leagues. (17, p. 18). As the probability of success in professional baseball is so slight, those who do become major league players must be exceptionally talented individuals. However, to conceive of their talent as being purely physical and independent of their mental-emotional structure would be inconsistent with scientific knowledge. The study of human behavior reveals that the individual functions as an integrated unit and that there is a co-ordination among what we call the physical, the emotional, and the mental. Therefore, for a player to develop the maximum physical ability of which he is capable, and the level of performance demanded by major league baseball, he must possess a mental-emotional structure which enhances this physical development.

The Experiment

To test the premise that personality is related to success in professional baseball, two groups of professional baseball players were selected and compared. The "success" group of players was composed of major league players from the American and National Leagues. The "non-success" group of players was drawn from the Class D Coastal Plains League. The players were measured and compared on the Minnesota Multiphasic Personality Inventory (15) and on a biographical data sheet developed by the author.

THE MINNESOTA MULTIPHASIC PERSONALITY INVENTORY (MMPI)

The MMPI was employed to measure the degree of existence of various personality traits. However, as the subjects were all normal individuals,

¹Success in this study means attaining the status of a major league player.

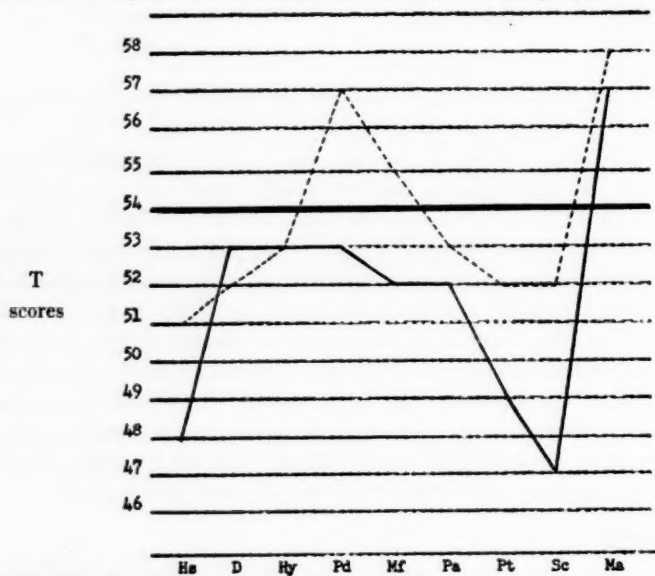
the MMPI terminology used in the nine clinical scales was not always appropriate. In cases where this terminology was not appropriate for normal individuals, adjectives and descriptions developed in other research using the MMPI were employed (7, 14, 15).

THE BIOGRAPHICAL DATA SHEET

The biographical data sheet was employed to determine whether or not specific situations and experiences were typical of the major league players as compared to the minor league players. The questions on the data sheet were designed to reveal information about the players' early home life, interests, experience in sports, and success in professional baseball.

COLLECTION OF DATA

Data for the study were collected during the 1951 baseball season. Forty-nine valid major league responses to the MMPI were obtained and 69 responses to the biographical data sheet. Sixty-four minor league players made valid responses to the MMPI and 70 to the biographical data sheet.



Solid line—Major league players
Dotted line—Minor league players

FIG. 1. MMPI profiles of major league and minor league players.

Analysis of Data

THE MMPI

Mean Analysis. *T*-tests conducted between the means of the major and minor league groups reveal significant differences on two of the MMPI scales. Differences occur on the Schizophrenia Scale significant at the 1-per-cent level, and on the Psychopathic Deviate Scale significant at the 2.5-per-cent

level. Both differences favor the major league players over the minor league players.

T-tests conducted between the means of the major league players and the means representing the general population demonstrate differences on several scales. Significant at the 2 per cent level is the lower score of the major league players on the Schizophrenia Scale. At the 1-per-cent level of significance, the major league players have higher mean scores on the Depression, Hysteria, Interest, and Hypomania Scales.

Minor league players differ from the general population on the basis of *t*-tests of the means on five scales. The mean scores of the minor league players are higher than the mean scores of the general population on the Hysteria, Psychopathic Deviate, Interest, Paranoia, and Hypomania Scales. All differences are significant at the 1-per-cent level.²

That the major league players score significantly lower than the minor league players on the Schizophrenia Scale, in addition to which the minor league players score significantly higher than the general population on the Paranoia Scale, indicates that the major league players are better adjusted for jobs requiring initiative, self-discipline, and social contact (14).

The significant difference between the major and minor league players on the Psychopathic Deviate Scale, supported by the fact that the minor league players also score significantly higher than the general population on this scale, suggests that the minor league players are more apt to digress from the accepted social mores. Their deviations would tend to occur in the forms of lying, stealing, alcohol or drug addiction, and sexual immorality (15, p. 19). This, too, indicates a lack of self-discipline.

Major league players score significantly higher than the general population on the Depression Scale indicating a greater tendency towards worrying, sensitivity, and frankness (7, p.79).

Both major and minor league players score significantly higher than the general population on the Hysteria Scale suggesting a greater tendency towards frankness and worrying (7, p. 79); the Interest Scale indicating greater sensitivity (7, p. 82); and on the Hypomania Scale which reveals individuals who are ambitious, vigorous, and full of plans (15, p. 21), and who are more likely to adjust to occupations requiring individual aggressiveness (14).

Profiles. Profiles representing major and minor league players appear in Figure 1. Significant scores on the profile are those greater than T54. The profile of the major league players reveals one such score. This score appears on the Hypomania Scale. A profile dominated by the Hypomania Scale indicates a personality pattern that is motivated by strong "drive" manifesting itself in the forms of aggressiveness, ambitiousness, and mental and physical vigorousness.

²See Table 1 for these results.

TABLE 1
Results of Testing 49 Major League Players and 64 Minor League Players on the Minnesota Multiphasic Personality Inventory

| Scales | Norms Mean | Major Mean | League S. D. | Players Var. | Minor Mean | League S. D. | Players Var. | t-Tests of Means | | | |
|----------------------|------------|------------|--------------|--------------|------------|--------------|--------------|--------------------|--------------------|-------------------|--|
| | | | | | | | | Majors Minors | Majors Norms | Minors Norms | |
| Hypochondriasis | 4.5 | 3.92 | 3.06 | 9.36 | 5.03 | 3.95 | 15.59 | 1.61 | -1.30 | 1.07 | |
| Depression | 16.66 | 18.02 | 3.53 | 12.45 | 17.75 | 4.35 | 18.94 | — .36 | 2.70 ¹ | 2.00 | |
| Hysteria | 16.5 | 18.39 | 3.97 | 15.79 | 18.28 | 5.05 | 25.45 | — .12 | 3.33 ¹ | 2.82 ¹ | |
| Psychopathic Deviate | 14.0 | 15.0 | 3.96 | 15.67 | 16.70 | 3.90 | 15.21 | -2.30 ³ | 1.77 | 5.54 ¹ | |
| Interest | 20.5 | 21.76 | 3.21 | 10.31 | 23.11 | 3.98 | 15.88 | 1.93 | 2.75 ¹ | 5.25 ¹ | |
| Paranoia | 8.0 | 8.84 | 2.75 | 7.57 | 9.23 | 3.47 | 12.01 | .65 | 2.14 | 2.84 ¹ | |
| Psychasthenia | 10.0 | 9.82 | 5.35 | 28.63 | 11.30 | 7.46 | 55.62 | 1.08 | — .24 | 1.39 | |
| Schizophrenia | 9.5 | 7.55 | 5.44 | 29.55 | 11.62 | 8.44 | 71.26 | 3.13 ¹ | -2.50 ² | 2.01 | |
| Hypomania | 14.0 | 17.16 | 3.96 | 15.65 | 17.66 | 3.92 | 15.35 | .67 | 5.58 ¹ | 7.47 ¹ | |

¹Significant at .01 level.

²Significant at .02 level.

³Significant at .025 level.

The profile of the minor league players reveals significant scores on the Psychopathic Deviate, Interest, and Hypomania Scales. A profile dominated by this particular triad is generally representative of behavior problem individuals (15, p. 25).

THE BIOGRAPHICAL DATA SHEET

Responses to the biographical data sheet reveal that:

(a) Baseball players come from families significantly larger than the average family.

(b) Minor league players are products of the "broken home" situation significantly more often than other members of the general population; this could be a factor in their tendency towards being behavior problem individuals.

(c) Baseball players grow up in rural areas significantly less frequently than do other members of the general population.

(d) Major league players start playing baseball at a significantly earlier age than do minor league players.

(e) A significantly large percentage of major league players did not enjoy great success in the minor leagues.

Summary

MAJOR LEAGUE PLAYERS

The dominant trait in the personality pattern of major league players, as revealed by their profile, is strong "drive" which expresses itself as ambitiousness, aggressiveness, and vigorousness. These characteristics are probably the forces that provide the propulsion necessary to attain success.

The mean analysis of the clinical scales indicates that this drive is supplemented by an ability to exercise self-discipline and to adjust to occupations requiring initiative and social contact of which professional baseball is an example. Self-discipline is important in that it is the restraining force which presumably enables the player to "direct" his drive toward his goal and to resist distracting and debilitating temptations. Initiative, like "drive," is a trait which permits the player to emerge above the average by taking advantage of, and even creating, opportunities. Being able to adjust in occupations requiring social contact indicates that the major league player is successful in getting along with other people. In an occupation which is as dependent upon teamwork and team harmony as professional baseball, this would appear to be axiomatic.

Of doubtful value in professional baseball, but apparently characteristic of major league players, are the tendency to worry and sensitivity.

MINOR LEAGUE PLAYERS

Although minor league players possess the same strong "drive" as major league players, the effect of the "drive" is not the same, owing to the existence of other traits which are detrimental. Primary among the detrimental traits of the minor league players is their relative lack of self-discipline which

possibly permits their strong "drive" to be dissipated. Minor league players also indicate a tendency towards not being able to adjust to occupations requiring initiative and social contact, which professional baseball demands. They also have an even stronger tendency towards sensitivity than the major league players. The profile of minor league players, furthermore, is similar to that of behavior problem individuals which is additional evidence of the lack of self-discipline.

Conclusions

The results of this study indicate that certain specific personality traits are associated with success in professional baseball. Major league players appear better able than minor league players to:

1. Apply their strong "drive" towards a definite objective by exercising self-discipline.
2. Adjust to occupations, as professional baseball, requiring social contact or the ability to get along well with other people.
3. Exercise initiative.

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National Practices on Release of Children During School Hours To Receive Private Dental Care

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Abstract

The material presented is a survey of the boards of education of all cities in the United States with populations of more than 90,000. The purpose was to determine policy as it relates to releasing school children during school hours in order to receive private dental care. 125 superintendents of education were polled, 75% of whom replied, demonstrating an active interest on the part of the educator in this subject. 67% of those replying favored the releasing of children from school for this purpose and 50% had developed formal excusal forms. The State of California is the only state in the union with specific legislation as it pertains to this matter, though many states have developed policy between the state department of education and the state department of health. This survey demonstrates that educators are aware of the importance of oral hygiene in general health and are taking appropriate measures to combat oral diseases.

A SURVEY WAS undertaken in June 1953 to determine the attitudes and policies of educators as they pertain to releasing school children during school hours in order to receive private dental care.

To the puritanical educator, the problem of educational interruptions has been a chronic source of irritation, and where such interruptions were tolerated it was with both resistance and reluctance.

Apparently, this picture is gradually changing, since this survey demonstrates that in the field of dentistry, in particular, there is the growing recognition by the educator that dental health plays an important role in general health and that the need for dental care is so vast that some school time must be given up for the child's well-being.

Procedure

Questionnaires were sent to the superintendents of schools of all cities with a population of more than 90,000 (1950 census). Cities from Fresno, California (population 90,618) to New York, New York (population 7,835,099) were covered. From the 125 questionnaires mailed, a total of 94 replies were received¹ (see Table 1).

The following questionnaire was sent:

1. Are students in your school system excused during the school day to visit a private physician or dentist?

¹Of the 48 states, only 42 have one or more city with a population of more than 90,000. Questionnaires were sent to cities in these 42 states and the District of Columbia. Replies were received from cities in 33 of these states as well as the District of Columbia.

- (a) Does any legislation (state or local) or school policy exist specifically authorizing the absence of children from school for this purpose?
- (b) If such legislation does exist, what was its date of enactment? (It is requested that a copy of such legislation be enclosed in your reply.)
2. Does your Board of Education have specific forms for private Medical or Dental Appointment Service, i.e., noting the time of the child's departure from school, the time of departure from the doctor's office, etc.? (It is requested that a copy of such a form be included in your reply.)
3. In the event of permitted absenteeism during the school day for health service, are provisions made for transporting the child to and from the private practitioner's office?
 - (a) If not, does the Board of Education assume any responsibility for injury to a child on authorized absence for this purpose?
4. Is authorized absence from school for health service deemed an absence in computing average daily attendance in order to secure apportionments from state school funds?
5. What objection if any can you see as an administrator in permitting a child to leave school during the school day in order to receive private medical or dental attention?
6. Remarks.

TABLE 1
Number of Questionnaires Mailed, Number of Replies, and
Percentage of Replies by Population Spans

| Population | No. of Cities Questionnaire Mailed to | No. of Replies | Percentage of Replies |
|--------------------|--|-------------------|--------------------------|
| 90,000 to 100,000 | 19 | 14 | 74 |
| 100,000 to 250,000 | 66 | 46 | 70 |
| 250,000 to 500,000 | 22 | 18 | 82 |
| More than 500,000 | 18 | 16 | 90 |
| Total | 125 | 94 | 75 |

Findings

In reply to Question 1 of the questionnaire, *Are students in your School system excused during the school day to visit a private physician or dentist?*, 94 replies were received and these have been grouped into three categories: 63 replied, "yes"; 15 replied, in effect, "sometimes"; 16 replied, "no."

The following remarks may serve to summarize the "yes," "sometimes," and "no" replies, respectively:

"Yes, definitely. We have had a long established policy of liberal excuses for medical and dental appointments."

"Occasionally, upon the request of parents. We encourage appointments to be made out of school hours but at the same time try to be reasonable in terms of the best health of the pupil."

"No, only in extreme cases are students excused."

In seeking additional information concerning Question 1 (a), *Does any legislation, state or local, or school policy exist specifically authorizing the absence of children from school for this purpose*, and Question 1 (b), *Date of enactment of such legislation*, a separate questionnaire was addressed to the state departments of education of the 48 states and the District of Columbia.

Of these 49 questionnaires, replies were received from 44 (43 states and the District of Columbia). From these, it was learned that only California has legislation (enacted in 1951) which specifically authorized the absence of a pupil from school for the purpose of having dental and medical service rendered, such absence not deemed an absence in computing average daily attendance. This may be found in the education code of California, Sections 6804 and 6806. These sections permit absence for optometrical, medical, and dental service, the number of absences for dental service being unlimited.

Though California is the only state with specific legislation regarding this matter, several states have formulated policy concerning it, e.g., Massachusetts, North Carolina, Oregon, Michigan, Pennsylvania, etc., and in essence their policy is:

"Children who need medical or dental care and who by necessity must make appointments with private physicians or dentists during the regular school hours should be accorded the same privilege as that enjoyed by children who with the approval of school authorities attend clinics, i.e., excuse without absence."

The vast majority of the remaining replies from the state departments of education were to the effect:

"We do not have any legislation or policy at the state level concerning this matter. However, the manner of excusing pupils during the school hours to keep dental appointments is one solely within the discretion of the local board of education."

At the same time they add:

"A very high percentage of our schools do release students for medical and dental health where it is requested by a physician or a dentist."

Having reviewed these attitudes at the state level, it is interesting to note local action which is, in fact, dependent upon the local boards of education in states other than California.

Even though 63 of the 94 reporting communities favored, with a positive attitude, the release of children during school hours for health service, only a relatively few have written established policies with regards to it:

12 replies from California schools have local policies conforming with state legislation.

11 replies (table 2) included copies of formal formulated policy explaining the "how" and "why" this came about.

40 remaining replies stated that they were following recommended state board of education policies or that it was a local school policy but failed to mention whether it was a formal policy or merely a practice left to the discretion of the individual principal.

The attitudes of these 40 may be summarized as follows:

"It is a common practice and I know of no written policy covering it. Children are encouraged to make appointments when school is not in session but this is not always possible and recognition must be made of the fact."

The 11 communities (see Table 2) with formal policies pertaining to the release of school children during school hours for health purposes adopted these policies through joint committees of the medical and dental society and the board of education. The preamble of these policies is the recognition by the educators of the great importance of dental health for children—the

importance of dental care to their physical, social, and scholastic welfare, and the vastness of the problem.

In contrast to California State Law permitting an unlimited number of excusals for dental appointments, Providence, Rhode Island has adopted a plan which limits these absences to six per term, the same number of excused absences being applicable for visits to a local public clinic.

The Dearborn Public Schools in 1953 in its revised statement relative to policies concerned with excusing students from school for outside activities, studied the entire problem and concluded that, "Only requests to have pupils excused for medical and dental appointments will be honored."

TABLE 2
*Communities by Population with Formal Policies Concerning the
Release of School Children for Dental Appointments*

| City | Population |
|----------------------------|------------|
| Dearborn, Michigan | 95,000 |
| Sommerville, Massachusetts | 102,000 |
| Evansville, Indiana | 110,000 |
| Erie, Pennsylvania | 130,000 |
| Tacoma, Washington | 139,000 |
| Providence, Rhode Island | 275,000 |
| Toledo, Ohio | 300,000 |
| Kansas City, Missouri | 453,000 |
| Milwaukee, Wisconsin | 633,000 |
| Cleveland, Ohio | 906,000 |
| Chicago, Illinois | 3,600,000 |

In reply to Question 2 of the questionnaire, *Does your board of education have specific forms for private medical or dental appointment service?* of the 63 replies favoring the release of children for this service 32 replied: "No," or "No regular form, a note usually suffices," or "Some dentists and physicians have their own forms."

The remaining 31 enclosed a form that is currently used for this purpose. In essence these forms have the child's name, school, time of departure from school, time of departure from dentist's office, time of return to school. A statement on the reverse side of these forms requests the co-operation of the dentists and parents in not abusing the privilege and in returning the child immediately to school following the service rendered.

In reply to Question 3 of the questionnaire, *In the event of permitted absenteeism during the school day for health service, are provisions made for transporting the child to and from the private practitioner's office?*, of the 63 favorable replies, in only one instance was it reported that the board of education transported the child in order to receive private medical or dental care and then only when it was impossible for the parent; however, many reported transporting children to clinics.

Question 3 (a) of the questionnaire states: *If not, does the board of education assume any responsibility for injury to a child on authorized absence*

for this purpose? This question was inserted in order to determine whether or not valid argument existed against the release of children because of liability involvements thrown upon a board of education. Of the 63 boards of education permitting the release of children during school hours, the replies were:

42, "No"

21, in effect:

"The Board of Education does not assume any responsibility for injury to a child in these cases. This is wholly the responsibility of the parent or guardian."

Question 4 of the questionnaire states, *Is authorized absence from school for health service deemed an absence in computing average daily attendance in order to secure apportionment from state school funds?* This question, too, was inserted in order to determine whether or not valid objection to releasing children existed on the premise that such excusing from school would affect state school funds. Of the 63 replies received:

43 stated: "No loss in apportionments from state school funds"

13 replied: "No, only if the child is absent for more than half a school day"

7 replied, "Yes"

Several of the "Yes" replies were obvious errors in understanding the question, since other indications, state law (e.g., California) or state department of education policy were to the contrary. However, one community specifically stated:

"Yes, children are counted absent." Another stated:

"Yes, a pupil is either actually present or absent at school."

In essence, the vast majority lose no funds from state sources with regards to this matter, provided the child first reports to school and is then dismissed or attends an early morning health appointment and then reports to school. In some states, state school funds are allocated on the basis of average membership and not on daily attendance.

In many instances where the child is absent all day, apportionments from state school funds are lost; however, it is unreasonable for a child to be absent for that length of time in order to receive private medical or dental care. It may be assumed that where policy to the contrary exists (that a child may not leave school during school hours) just such absences are occurring. In other words, since the child may not leave school in order to keep a private appointment, he is kept out of school the entire day by his parent on the premise that he is not well.

It is interesting to note further that among the 31 communities (16 reporting that children are "not permitted to leave school" and 15 reporting "sometimes") approximately the same proportion report that there is no loss from state funds if such absenteeism were permitted.

Finally, Question 5 asks, *What objection, if any, can you see as an administrator in permitting a child to leave school during the school day in order to receive private medical or dental attention?* and Question 6 leaves space for *Remarks*. Replies to these two questions are grouped together since in most instances the administrator replying made no differentiation.

Of the 63 communities releasing children, these are the typical replies received to Questions 5 and 6:

"None, it is just good common sense."

"If the child were not permitted to go to the physician or dentist at the time appointment could be made, this service might be denied him."

"It is the feeling of the administration here that today's modern dentists and physicians do considerable health education in the time of these dental and medical appointments—at which time, the child is most receptive to learning, a time when he is actually experiencing something himself. Therefore, it is our feeling that more frequently than not the child may actually learn more—as well as get the needed medical or dental attention—in a physician's or dentist's office than he would have in the classroom."

Several replies to Question 5 and 6 make mention of the dangers of abuse to such a program by either the doctor, the child, or the parent and add that in addition there is a loss of education time to the child and some resulting confusion in the administration of such a program. However, they add that instances of abuse of the privilege have been rare and that absences have not been excessive.

From among the 31 additional replies, those constituting the "No's" and "Sometimes" to the releasing of children during school hours, the following statements have been made in reply to Questions 5 and 6:

"I can see no reason for permitted absenteeism during the school day (except in cases of extenuating circumstances). I believe that a policy to the contrary would constitute an invitation to the parents to view lightly the importance of regular school attendance."

"If the child is a paying patient he should not be forced to sacrifice his school time any more than paying adult patients should be forced to sacrifice business hours except in emergency situations."

In general, it may be stated that the question of excusing school children for health service visits to a private physician or dentist has been given much thought by school administrators. Sufficient interest in this subject is apparently sustained since 75 per cent of the questionnaires were answered and of these, 67 per cent endorsed this practice.

For the immediate future, the policy of releasing school children in order to receive private dental care will have to be continued if the best interest of the child is to be served. But with the fluoridation of public water supplies and an attending two-third reduction in tooth decay, this policy in all probability will be altered. For that reason, boards of education, school administrators, teachers, parents and the community in general have a very definite stake in fluoridation.

Discussion

The purpose of this paper has been two-fold: (1) to point out some of the factors that need to be considered in assaying the problem of excusing children from school during school hours in order to receive private dental care, and (2) to ascertain existing practices in boards of education nationally as it pertains to this matter.

The co-operation and assistance of the parents, educators, and community in combating oral diseases is essential, for, in spite of all the modern techniques available, dental decay is advancing at a pace beyond the dentist's ability to meet. Dental decay is more rampant today than a generation ago and was more rampant then than a generation ago.

The only solution is prevention and early treatment—prevention through the fluoridation of public water supplies which can be achieved only through the co-operative efforts of parents, educators and community, and early treatment through the understanding and co-operation of the parents, educators, and dentists. Though some school time must be given up in order for school-age children to receive dental care, educational experiences are still going on. To use the words of one superintendent of education:

"...modern dentists and physicians do considerable health education at the time of these dental and medical appointments at which time the child is most receptive to learning, a time when he is actually experiencing something himself. . . ."

Summary

In attempting to ascertain current practices, nationally, concerning the excusing of children during school hours in order to receive private dental care, questionnaires were mailed to all cities in the United States with populations of over 90,000 (1950 census). Of the 125 questionnaires, 94 replies were received and fully two-thirds of those reporting (63) authorized the practice of excusing children for this purpose. It is interesting to note that a high level of interest exists concerning this subject, since 75 per cent of the questionnaires were returned completed, many with an accompanying letter offering additional information.

It was learned that the State of California has specific legislation authorizing unlimited absenteeism for this purpose, while several states have formulated such a policy at the state level—worked out jointly between the state department of education and the state department of health. However, recommended policy at the state level favoring this action in some instances apparently has little influence locally.

From the 63 replies, 23 boards of education have formal written policy permitting private dental care during school hours. Twelve of these are California cities in accordance with State Legislation. The remaining 11 have developed this formal policy (with two exceptions) since 1949, which demonstrates, in part, the growing recognition of the importance of good oral health.

It is rather contradictory that permitted absenteeism to attend clinics is both acceptable and desirable as pointed out in many replies. Yet, some of these same administrators oppose releasing a child in order to keep a private appointment. Massachusetts, in its joint policy formulated by the Massachusetts State Department of Education and the Massachusetts Department of Public Health, concluded:

"Children who need medical or dental care and who by necessity must take appointments with private doctors or dentists during the regular school hours should be accorded the same privilege as that enjoyed by children who, with the approval of school authorities, attend clinics, i.e., excuse without absence."

The problem of excusing children during school hours is a many faceted one and no one solution is applicable to every community. Certainly, in considering this problem, thought should be given to the age of the child, the threshold of fatigue of the child, the DMF index² of the community, the amount of "effective demand"³ for dentistry, the number of dentists practicing dentistry for children, the time, distance, and transportation factors involved between the school and the private dentist's office, ratio of dentists to unit of population, and so on.

In the final analysis, the health and welfare of the child is of primary consideration. Only by the educator's understanding of the problems associated with children's dentistry and only by the dentist's understanding of the problems associated with educational interruptions can a solution be found that will work to the best advantage of the child.

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²DMF index is a tool in dentistry designed to measure the incidence of dental decay. The letters stand for Decayed, Missing, Filled.

³"Effective demand dentistry" implies that group of the population who desire dental care and have the ability to pay for it. It is used in distinction to "potential demand"—that group who also desire dental care but who cannot afford to pay for it.

Relationship of Arm Strength, Weight, and Length to Speed of Arm Movement

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Abstract

In this study the length, strength and weight of the arm and its segments were measured and correlated with the maximum speed of voluntary movements. From the experimental findings recorded there is no statistically significant correlation between the speed of voluntary movements of the hand, forearm and arm and the weight, length and strength of the arm and its segments.

THE SPEED WITH WHICH an operator can move to manipulate controls is often a limiting factor in the performance of military and industrial tasks and athletic events. Foley (1) has reviewed the literature dealing with the relationship of the following factors to motor speed and tempo: psychological, age, sex, constitutional type, race, intercorrelational analysis, factor pattern analysis, character type, and social and occupational. Koepke and Whitson (2) found that there was no definite relationship between height, weight, whole arm length, forearm length, size of upper arm at biceps or size of wrist and the power and velocity attained by the subject.

It was the purpose of this study¹ to determine the relationship existing between the speed of voluntary movements of the hand, forearm and arm and the weight, length and strength of these segments of the body.

Apparatus

Speed of movement was obtained by use of a contact chronoscope. Basically, the device consisted of two movable posts, each covered with sponge rubber so that it could be contacted at maximum speed without fear of injury. When either contact was pressed, the chronoscope stopped. When the pressure was released, the apparatus recorded the interval until a post was again depressed. The timer was a Standard S-1 Timer, 115 volts, 60 cycle, WD 7742-B, manufactured by the Standard Electric Timer Company. This instrument is designed to measure intervals of .01 second to an accuracy of .005 second, and the technician who constructed the apparatus considered that interpolations of .0025 second could be made with accuracy. Strength of the segments tested was measured by recording the pull exerted against a Chatillons Improved Spring Balance, Type 34H. Because of the grossness of calibration on the scale, readings were made in two-pound increments.

¹This study was submitted in partial fulfillment of the requirements for the degree of Master of Arts in the Division of Health, Physical Education, and Therapy, University of Southern California.



FIGURE 1. Contact chronoscope being used to measure speed of arm movement. The timer is activated as soon as pressure against the contact post is removed and is stopped again as soon as pressure is applied to the other post.

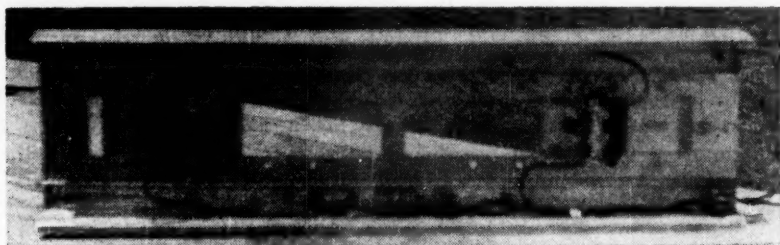


FIGURE 2. Underview of chronoscope, showing wiring plan.

Procedure

The operating procedure described below was followed in each case:

(a) The posts of the contact chronoscope were placed six inches apart. The subject was seated at a table with the forearm of his dominant hand on a level with the machine, his forearm in the mid-position and his wrist held from underneath by the other hand. The position of the wrist was equidistant from the two posts, with the fingers held straight and the hand abducted so that the fingers were in contact with one post. The subject voluntarily flexed the wrist and contacted the other post at maximum speed. The chronoscope then showed the time required for this movement. After the subject had made enough trials so that he felt familiar with the technique and "warmed up," the procedure was repeated, with the figures shown on the chronoscope being recorded. Each subject was given three trials and the average of the three was accepted as the best figure. In cases where one of the trials gave a

result greatly out of line with the other two, it was discarded and a fourth trial was allowed. Adduction was timed in a similar manner.

(b) The posts of the contact device were placed 14 inches apart. The subject bent his dominant arm at the elbow and held the arm above the elbow steady with his other hand. The elbow was equidistant from the two posts. With the wrist and fingers held straight, the forearm was pivoted at the elbow so that the fingers were in contact with a post. By moving the forearm without moving the elbow, speeds of abduction and of adduction of the forearm were then measured in a manner similar to that used to time movements of the hand.

(c) The posts were placed 20 inches apart. The subject extended the arm from the shoulder, with the elbow joint, wrist joint and fingers held straight. The arm was swung from the shoulder so that the fingers contacted one of the posts. Speed of abduction and adduction of the extended arm were measured in a manner similar to that used to time movements of the hand and forearm.

(d) The subject then stood erect with the arm pendulous and the acromion-dactylion, acromion-radiale, radiale-stylian, and hand lengths were measured in accordance with instructions given by Wilder (3).

(e) The subject then extended the arm to the side at the shoulder level and the scapulohumeral, elbow, antebrachial, and digital perimeters were measured, as well as the intervals between them. A steel tape was used, applied as lightly as possible to avoid indenting the skin, as described by McCloy (4). These measurements were taken to provide a method of calculating the approximate weight of the arm according to the formula suggested by Webster (5):

$$W = 0.02219H (p_1^2 + p_2^2 + \sqrt{p_1^2 p_2^2}) \text{ grams}$$

where

W = Approximate weight of the arm in grams.

p = Perimeter of the limb in centimeters.

H = Distance between perimeters in centimeters.

(f) The subject was again seated at the table, with the wrist of the dominant hand held in the opposite hand and the hand abducted to 15 degrees. A strap was placed around the hand just below the fingers, the other end hooked to a scale, and a pull exerted until the hand was forced into the straight position. The pounds pull required to produce this movement were recorded. The hand was then adducted 15 degrees and a pull was exerted until the hand was again straightened. These procedures gave abduction and adduction breaking points. The method will be recognized as a modification of the breaking point technique described by Martin (6). Forearm and extended arm strengths were obtained in a similar manner.

The procedure described above was administered to twenty-five males between the ages of 17 and 47. With a single exception, these men had histories of extensive athletic experience. A summary of the experimental data obtained is presented in Table 1.

TABLE 1
Summary of Experimental Data

| Measurement | Range | Mean |
|--------------------------|-------------------------|---------------|
| <i>Hand</i> | | |
| Abduction speed | .0200 - .0625 sec. | .0426 sec. |
| Adduction speed | .0300 - .0500 sec. | .0374 sec. |
| Abduction strength | 17 - 60 lb. | 34.0 lb. |
| Adduction strength | 18 - 50 lb. | 32.8 lb. |
| Length | 17.8 - 21.0 cm. | 19.9 cm. |
| <i>Forearm</i> | | |
| Abduction speed | .0517 - .0950 sec. | .0725 sec. |
| Adduction speed | .0575 - .1183 sec. | .0743 sec. |
| Abduction strength | 14 - 56 lb. | 31.8 lb. |
| Adduction strength | 16 - 48 lb. | 31.5 lb. |
| Length | 22.4 - 26.5 cm. | 25.1 cm. |
| <i>Arm</i> | | |
| Abduction speed | .0483 - .1230 sec. | .0775 sec. |
| Adduction speed | .0708 - .1283 sec. | .0992 sec. |
| Abduction strength | 13 - 50 lb. | 29.1 lb. |
| Adduction strength | 18 - 40 lb. | 28.1 lb. |
| Length | 70.8 - 80.4 cm. | 75.0 cm. |
| Calculated weight | 1827.58 - 2940.23 grams | 2454.88 grams |

TABLE 2
Correlations

| Anthropometric Measure | Speed of Hand Abduction | Speed of Hand Adduction | Speed of Forearm Abduction | Speed of Forearm Adduction | Speed of Arm Abduction | Speed of Arm Adduction |
|--|----------------------------|----------------------------|-------------------------------|-------------------------------|---------------------------|---------------------------|
| Strength of hand abduction | .140 | .257 | .049 | .108 | .086 | .337 |
| Strength of hand adduction | | | | | | |
| Strength of forearm abduction | | | | | | |
| Strength of forearm adduction | | | | | | |
| Strength of arm abduction | | | | | | |
| Strength of arm adduction | | | | | | |
| Length of arm | | | | | .161 | .030 |
| Calculated weight of arm | | | | | .297 | .108 |

Results

From the data summarized in Table I the coefficients of correlation between the speed of movement and arm strength, weight and length were computed by the Pearson product-moment method. The results are summarized in Table 2. No statistically significant correlations were found. Apparently the inertia of the larger arm is adequately overcome by superior mechanical and muscular components.

Summary and Conclusions

The speed of movement of segments of the arm of 25 subjects was measured and correlated with certain anthropometric measurements of the arm to determine the relationship of the strength, weight, and length of these segments to the maximum speed of voluntary movement. It may be concluded from the experimental results of this study that no definite relationship can be found between speed of arm movements and the size or weight of the arm.

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Special Conditioning Exercises for Students with Low Scores on Physical Fitness Tests

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Abstract

Thirty-three male Freshmen who made low scores on the physical fitness tests when they entered the University of Iowa were given special conditioning exercises. Their progress for one semester was compared to that of 33 students taken at random from Freshman students who participated in regular physical education classes.

The experiment group gained an average of seventeen points in comparison to an average gain of 11 points by the control group when the tests were repeated at the end of the semester.

A low positive correlation was found, for the experiment group, between "gains" in physical fitness and grade point average.

THE MALE STUDENTS who participate in the physical education curriculum in basic skills at the State University of Iowa are required to take a battery of four physical fitness tests. A scoring system has been developed (see Table 1) and the mean of the *T*-scores for the physical fitness tests must be at least 45 for a student to qualify for exemption from physical education. The student must meet other standards in sports skills for exemption, which will not be discussed in this paper.

The author examined the records of the students who participated in the basic skills course in physical education from 1948 to 1951 and found that the students who had the most difficulty in meeting the requirements for exemption were those who had the lower scores on the physical fitness tests. The author decided, therefore, that for the academic year 1951-52 all entering students who had a mean *T*-score of less than 20 should be given a special program of activities. It was the major purpose of this study to determine the effect of this special program upon the scores of these students when they repeated the fitness tests at the end of the first semester. Supplemental information concerning entrance test scores and grade point averages was included in an effort to determine the relationship of these two factors to improvement in physical fitness.

Procedure

The mean *T*-scores for all male students who took the four fitness tests in September 1951 were examined. The 33 students who had mean *T*-scores of less than 20 were placed in the experiment group. These students did not participate in the same general conditioning program, which consisted of a 20-min. calisthenics drill, that was given to the regular classes in basic skills as a routine part of their course in physical education. They were given, in-

TABLE 1
Physical Fitness Tests

| | <i>T-Score</i> | Sit-Ups (2 min.) | Pull-Ups | 100 yd. Pick-a-Back | 300 yd. Shuttle Run (5 laps) |
|---|----------------|---------------------|----------|------------------------|------------------------------------|
| A | 100 | 92 | 22 | 15.5 | 44.8 |
| | 95 | 88 | 21 | 16.0 | 45.2 |
| | 90 | 84 | 19 | 16.5 | 45.7 |
| | 85 | 81 | 18 | 17.5 | 46.2 |
| | 80 | 77 | 17 | 18.5 | 46.7 |
| | 75 | 73 | 15 | 19.0 | 47.3 |
| B | 70 | 69 | 14 | 20.0 | 47.9 |
| | 65 | 66 | 13 | 20.5 | 48.7 |
| | 60 | 62 | 11 | 21.5 | 49.5 |
| | 55 | 58 | 10 | 22.5 | 50.2 |
| C | 50 | 54 | 9 | 23.0 | 51.2 |
| | 45 | 51 | 7 | 24.0 | 52.2 |
| | 40 | 47 | 6 | 24.5 | 53.4 |
| | 35 | 43 | 5½ | 25.5 | 54.9 |
| | 30 | 39 | 5 | 26.0 | 55.5 |
| D | 25 | 36 | 4 | 27.0 | 56.5 |
| | 20 | 32 | 3 | 28.0 | 57.5 |
| | 15 | 28 | 2 | 28.5 | 58.5 |
| F | 10 | 24 | 1 | 29.5 | 59.5 |
| | 5 | 21 | 0 | 30.5 | 61.0 |

stead, conditioning activities which included (1) pull-ups, (2) two-minute sit-ups, (3) 220-yard run, (4) 440-yard run, (5) 660-yard run, (6) 880-yard run, (7) mile run, (8) arm curls with heavy resistance, (9) arm pull-overs with heavy resistance (supine), and (10) push-ups.

Since only 20 minutes of each two-hour-class period (the basic skills classes met twice each week) were devoted to conditioning activities, and the remaining time to sports skills, it was possible to have the experiment group perform either three or four of the conditioning activities each class period. Care was taken to include at least one running exercise, an arm exercise, and an abdominal exercise. The 33 men in the experiment group were given individual attention, and their performances were carefully recorded for every class that they attended.

During the last week of January 1952, the physical fitness tests were administered for the second time to all of the basic skills students. The scores made by the experiment group at the beginning and at the end of the semester were computed. In order to determine the significance of the "gains" made by the experiment group, a control group of 33 students was selected at random from a population of more than 500 students who had recorded an average *T*-score of more than 20 when they took the four physical fitness

tests at the beginning of the semester. The "gains" made by the experiment group and the control group were then compared.

In order to learn more about the effects of the special program upon the experiment group, a second control group was established. This group was composed of 33 students from previous academic years who had mean *T*-scores of less than 20 on their first effort to pass the physical fitness tests. The "gains" made by this group from the beginning to the end of a semester were compared to those of the other two groups.

A composite score based on six of the entrance tests, which are given to all entering Freshmen (College of Liberal Arts) at the State University of Iowa, was obtained for each subject.¹ The tests from which the composite scores were computed include the following:

1. English Placement
2. Interpretation of Reading Materials in the Social Studies
3. Interpretation of Reading Materials in the Natural Sciences
4. Interpretation of Literary Materials
5. Basic Skills in Mathematics
6. General Vocabulary

A grade point average, for the semester during which the student was used as a subject for this study, was obtained from the registrar's office.²

Analysis

The "gains" (or losses) in mean *T*-scores between the first performance and the second performance on the fitness tests were recorded for all of the subjects. For each of the three groups, the mean of the "gains" was computed. Significance ratios were computed to determine whether or not the differences between the three group means were statistically significant. As shown in Table 2, the experiment group had the largest mean of the three groups, and the differences between this mean and the means for the other two groups were statistically significant.

TABLE 2
*Statistical Significance of the Differences in the Means of the Gains
for the Three Groups*

| Group | Means for First Test | Means for Second Test | Mean Gains | Dif- ferences in Mean Gains | <i>t</i> | Level of Signifi- cance |
|----------------------|-------------------------------|--------------------------------|---------------|--------------------------------------|----------|----------------------------------|
| Experiment | 14.34 | 31.32 | 16.98 | 6.07 | 4.13 | .001 |
| First Control | 35.62 | 46.53 | 10.91 | | | |
| Experiment | 14.34 | 31.32 | 16.98 | 4.86 | 3.10 | .010 |
| Second Control | 15.09 | 27.21 | 12.12 | | | |
| First Control | 35.62 | 46.53 | 10.91 | 1.21 | .90 | .400 |
| Second Control | 15.09 | 27.21 | 12.12 | | | |

¹Personal communication from Dr. Robert L. Ebel, Director of the University Examination Service of the State University of Iowa.

²Personal communication from J. Harvey Croy, Recorder, Office of the Registrar, State University of Iowa.

The difference between the mean of the first control group and the mean for the second control group was not statistically significant.

In Table 3, the three variables are intercorrelated for the experiment group. The correlation coefficient for the physical fitness gains and the composite scores indicates a low negative relationship. Although the remaining two coefficients are not statistically significant at the 5-per-cent level of confidence (for 33 subjects an r must exceed .34 to be significant at the 5-per-cent level), they show a positive relationship between the physical fitness gains and the grade-point average, as well as between the grade point average and the composite scores.

The correlation coefficients for the first control group, shown in Table 4, indicate little or no relationship between physical fitness gains and the other two variables. The correlation coefficient .673 for the composite scores and the grade point averages, however, was much higher for this group than for the experiment group.

TABLE 3
Correlation Coefficients for Physical Fitness Gains, Composite Scores on University Tests, and Grade Point Averages for the Experiment Group

| Item | Fitness Gains | Composite Score |
|----------------------|---------------|-----------------|
| Composite Scores | -.188 | |
| Grade Point Averages | .328 | .328 |

TABLE 4
Correlation Coefficients for Physical Fitness Gains, Composite Scores on University Tests, and Grade Point Averages for the First Control Group

| Item | Fitness Gains | Composite Score |
|------------------|---------------|-----------------|
| Composite Scores | .004 | |
| Grade Point | .104 | .673 |

Discussion

The special program of exercises given to the experiment group enabled them to make greater gains in their level of physical fitness, as measured by the four tests used in the basic skills curriculum at the University of Iowa, than either one of the control groups that participated in the regular program. Since approximately one-third of the special program of exercises included practice in the tests used to measure physical fitness level, the gains found for the experiment group could be attributed, at least in part, to the specific practice effects of the activities.

For the experiment group, the two correlation coefficients of .328 which were found to be significant at the 7-per-cent level of confidence could be rejected categorically (at the 5-per-cent level). In consideration of the size of the sample and the level of confidence established, the author does not wish to conclude that improvement in physical fitness is not related to grade point averages, nor that the composite scores are not related to grade point averages. Further investigation of the relationship between improvement in physical fitness and scholastic performance should be made of the student who makes an initial low score on a physical fitness test.

In respect to the correlation coefficient found between the composite scores and the grade point averages of the experiment group, it was somewhat lower than that of .47 found by the University of Iowa Testing Service³ on a large sample. The .673 coefficient found for the first control (high-level fitness) group was, of course, higher than that found by the Testing Service. These correlations indicate that scholastic success is related to a higher degree with entrance test scores for students of high-level fitness than for students of low-level fitness.

Conclusions

1. Greater gains in physical fitness level can be achieved by the low-level student if he is afforded an opportunity to take part in a special program of conditioning exercises.

2. There is a higher correlation between gains in physical fitness and academic success for low-level fitness students than for high-level fitness students.

(Submitted 10-26-53)

³Personal communication from Dr. Robert L. Ebel, Director of the University Examination Service of the State University of Iowa.

Effect of Blinking Upon Reaction-Time Measures

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Abstract

The possible effects of normal involuntary blinking upon reaction time measures were investigated through a comparison of blink rates and the incidence of blinking in relation to preparatory signal, response signal, and the subject's response. Analysis of the data revealed that: (1) the frequency of blinking was markedly decreased during reaction time responses, (2) blinking was generally inhibited between presentation of the preparatory signal and the subject's response, and (3) blinks coincided with presentation of the response signal in only 0.1 per cent of the cases. The results indicated that blinking has little effect upon reaction time measures.

ALTHOUGH NORMAL involuntary blinking has been a popular area of research, the majority of studies in this area appear to have been concerned primarily with the frequency of blinking or the relationships between frequency of blinking and such factors as readability, effectiveness of illumination, difficulty of task, etc. (1, 2, 6, 7, 8). An apparently neglected aspect of blinking has been recently discussed in two reports by Lawson (3, 4). It is the conclusion of this investigator that the simple act of blinking may account for errors in human performance ranging from automobile accidents to failure of a bombing mission, from misread scientific instruments to missed tennis balls.

The reason for these consequences of blinking appears to rest in the fact that during a blink the pupils are masked by the lids, and a complete visual blackout ensues. According to Lawson, blinks involve a blackout period ranging from 0.1 to 0.3 seconds. These estimates, however, have been based upon studies of the duration of the complete blink movement, and they undoubtedly exaggerate the actual blackout interval during a blink.

In a recent investigation of the blink blackout interval, Slater-Hammel (5) found the average blackout threshold for a group of 25 subjects to be 0.06 sec., with individual thresholds ranging from 0.04 to 0.09 sec. Although these threshold values are considerably shorter than the estimates presented by Lawson, it is not to be concluded that the blink blackout interval is insignificant. Actually, a blackout interval of only 0.06 second could have important consequences in many high speed activities. As pointed out by Slater-Hammel, a pitched ball could cover a distance of approximately nine feet during an average blink blackout.¹ In terms of the individual threshold values for the subjects in his investigation, a blink during the pitch would

¹This estimate is based upon the assumptions that a pitched ball travels at uniform velocity and takes 0.04 second to travel from the pitcher to home base.

mean that the ball could not be seen over a range of from 6 to 14 feet of its flight. When applied to other situations, it becomes evident that the blink blackout can play an important, if not a dominant, role in many areas of human activity.

One aspect of the blinking problem which has intrigued the present investigator involves the possible effects of the blink blackout upon reaction-time measures. In view of the possibility that presentation of the response stimulus in a reaction-time situation might often occur during some phase of a blink, the blink blackout may account for some of the variability in an individual's reaction-time measures. The investigation herein reported is concerned with this possibility.

Method and Procedures

The method used to investigate the effect of blinking upon reaction time measures involved the following: (1) a comparison of the blink rate in a non-reaction-time situation with the rate in a reaction-time situation; and (2) determination of the time of blinking in a reaction-time situation, i.e., the incidence of blinking in relation to preparatory signal, response signal, and subject's response. The non-reaction-time situation involved a period during which the subject simply answered questions relative to educational background, health habits, and recreational interests.

Apparatus: Since the apparatus used to record the blink rate was essentially the same apparatus described in an earlier publication (5), it will not be described here in detail.

Briefly, the blink rate was obtained by attaching a small piece of #38 copper wire to the subject's upper eyelid. When the lid was lowered during a blink, the end of the copper wire entered a container full of mercury. Contact of the copper wire with the mercury served to trigger an electronic timer which produced a square wave pulse, and this pulse activated a 600/min. electric counter. Thus, each time the eyelid was lowered, the event was recorded on the counter.

In the reaction-time phase of the investigation, the subject was required to depress a telegraph key. A buzzer served as a preparatory signal, and a neon glow lamp served as the response signal. In addition to counting blinks during reaction-time responses, a Teledeltos polygraph was used to record the incidence of blink in relation to sounding of the buzzer, presentation of the light signal, and the subject's response. A sample of the record obtained is illustrated in Figure I.

An adjustable head and chin rest was provided both for the subject's comfort and for stabilizing his head during the course of the investigation.

Subjects and Procedures: Twenty-five male graduate students in physical education served as subjects. Their ages ranged from 25 to 41 years, their median being 30.

At the start of each measurement period, the subject was seated before a table in a room adjacent to the recording laboratory. To obtain the blink



FIGURE 1. A typical record showing inhibition of blinking between presentation of preparatory signal and subject's response. Reading from top to bottom the lines indicate: preparatory signal, subject's blinks, response signal, subject's response, and 60-cycle time line.

rate during a non-reaction-time situation, the subject was required to answer questions put to him by an assistant. During this question-and-answer period, the investigator sat in the recording laboratory and recorded the blink rate per minute for a period of 10 minutes.

To obtain the blink rate during a reaction-time situation, the subject was required to complete a series of 140 reaction-time responses. These responses were made at a rate of approximately 14 per min. for a period of 10 min. The time interval between presentation of the preparatory buzzer signal and the light signal was systematically varied during the series of responses. These intervals were approximately one, two, and three seconds arranged in random order. An assistant presented the reaction-time signals, while the investigator recorded the blink rate per minute for a period of 10 min. A permanent record of the incidence of blink during the reaction-time responses was also obtained.

In requiring the subject to complete a total of 140 responses in a 10-min. period, an attempt was made to arrange a measurement period in which the total time engaged in a reaction-time situation was equal to approximately one-half the total measurement period. Defining a reaction-time situation as including the time interval between presentation of the preparatory signal and the subject's response, the average reaction-time situation was estimated as 2.2 sec. This estimate includes a time interval of two seconds for the average time between presentation of the preparatory and response signals plus an interval of 0.2 sec. for the estimated average reaction time. Under these conditions, the total time engaged in a reaction-time situation would be $2.2 \times 140 = 308$ sec., which is roughly one-half of the 600-sec. measurement period. In view of the fact that the average reaction time for the subjects of this experiment was eventually found to be 0.206 sec., the assumption of approximate equality between total time in a reaction time situation and total time between reaction time situations seems to be justified. This approximate equality was used to evaluate the incidence of blinks in a reaction-time situation.

Results and Discussion

Table 1 summarizes the blink rate data under each experimental condition. For the subjects used in this investigation, the mean blink rate per minute in a question-answer period was 21.85 as compared with a mean blink rate of 11.40 in a reaction-time situation. That this difference between blink rates is significant is revealed by a t value of 4.13. For 24 degrees of freedom, a t value of 2.797 is significant at the one per cent level of confidence. Therefore, the hypothesis that this difference could be attributed to chance is rejected.

TABLE 1
Comparison of Blink Frequencies While Answering Questions and During Reaction-Time Responses

| Item | Mean blinks per minute | Standard deviation |
|---------------------|------------------------|--------------------|
| Questions | 21.85 | 15.37 |
| Reaction time | 11.40 | 12.94 |
| Difference | 10.45 | |
| t | 4.13 | |
| P | .01 | |

Table 2 presents a summary of the blink incidence for 3,500 reaction-time records. A comparison of the frequency of blinks during consecutive reaction responses revealed that 85.9 per cent of the blinks occurred between reaction time responses, and only 14.1 per cent of the blinks occurred during reaction time situations. Since the total reaction-time situation was roughly equal to the total time between reaction-time situations, it is not unreasonable to expect that the percentage of blinks in each interval should be approximately equal. The fact that blinks occurred about six times more frequently between reaction-time situations would seem to indicate a pronounced tendency to inhibit blinking during the reaction-time situation. A typical record of this tendency is illustrated in Figure I.

TABLE 2
Frequency and Percentage of Blinks During a 10-Minute Reaction-Time Measurement Period

| Period | Number of blinks | Per Cent |
|---------------------------------------|------------------|----------|
| Between reaction-time situations..... | 2447 | 85.9 |
| During reaction-time situations..... | 402 | 14.1 |

Since a subject frequently had more than one blink during a reaction-time situation or between reaction-time situations, further insight into the possible effect of blinking upon reaction measures is obtained by a consideration of the presence or absence of blinking during each interval. Analysis of the data in these terms revealed that blinks occurred between reaction-time situations in 55 per cent of the cases and during reaction-time situations in only

9 per cent of the cases. In other words, blinks did not occur in 91 per cent of the reaction-time situations.

An examination of the instances where blinks occurred during reaction-time situations revealed that only 7 per cent of the cases involved blinks between presentation of the preparatory and response signals. Although a blink during this interval may be considered a definite "risk," it does not follow that the subject will always be blacked out when the response signal is presented. Assuming an average blackout interval of .06 seconds (5), and considering the fact that a time interval of 1-3 seconds intervened between presentation of the preparatory and response signals, it is possible for the subject to have frequently recovered from a blink blackout before presentation of the response signal. That such was usually the case is revealed by the finding of only 4 instances in which a blink was initiated during the interval of from .06 seconds before to the start of the response signal. It would thus appear that the subjects in this investigation were blacked out for approximately 0.1 per cent of their reaction-time responses.

In view of the findings that the frequency of blinking was markedly reduced during reaction-time responses, that blinking was generally inhibited during reaction-time situations, and that blackouts coincided with presentation of the response stimulus in only 0.1 per cent of the responses, it is concluded that the blackout effect of blinking cannot be used to account for much of the variability in reaction-time measures.

Although this conclusion has been based upon an over-all analysis, it would seem of more than passing interest to note that 3 subjects accounted for 49 per cent of the cases in which blinks occurred during reaction-time situations. This suggests that some few subjects run greater risks of being blacked out during presentation of the response signal. These subjects differed from the other subjects in that their blink rate was not markedly reduced during reaction-time measures. Their mean blink rate per minute in the question-answer period was 40.5 as compared with a rate of 38.5 during reaction-time responses. These subjects also accounted for all instances in which a blink

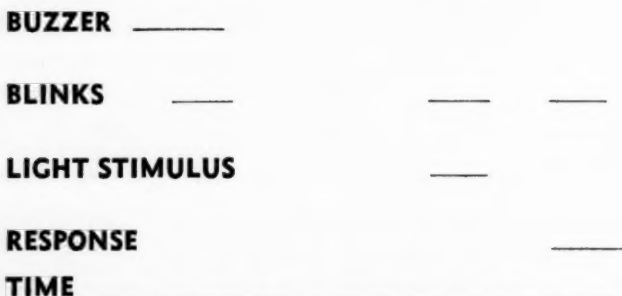


FIGURE II. Record showing subject in blink blackout during presentation of the response signal. Reading from top to bottom the lines indicate: preparatory signal, subject's blinks, response signal, subject's response, and 60-cycle time line.

coincided with presentation of the response signal. An interesting example of this coincidence is illustrated in Figure II. In the response illustrated in Figure II, the subject's reaction time was .40 seconds; in all responses in which a blink did not coincide with presentation of the response signal, the subject's reaction-time ranged from .21 to .26 sec.

Summary and Conclusions

1. Twenty-five male subjects were employed in a study designed to explore the possible effects of blinking upon reaction time measures. The method used involved: (1) a comparison of the blink rate during a non-reaction time situation with the rate during a reaction time situation, and (2) determination of the incidence of blinking in relation to preparatory signal, response signal, and the subject's response.

2. Analysis of the data indicated that: (1) the frequency of normal involuntary blinking was markedly decreased during reaction-time responses, (2) blinking was generally inhibited between presentation of the preparatory signal and the subject's response, and (3) blinks coincided with presentation of the response signal in only 0.1 per cent of the cases.

3. In view of the findings of this investigation, it was concluded that the blink blackout cannot be used to account for much of the variability in reaction-time measures.

4. An examination of individual blinking habits suggested that some few subjects run greater risks of being blacked out during reaction-time responses.

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Extramural Competition and Physical Education Activities for College Women

Condensed Report of the Committee on Competition
of the
National Association for Physical Education of College Women

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Abstract

This article summarizes the findings of a survey of practices, policies and problems in the conduct of extramural participation for women in 230 American colleges and universities. All but a small percentage participate in extramural competition (sports days, play days, etc.) and/or non-competitive activities (symposia, performances, demonstrations). A total of 28 per cent participate in varsity-type competition. The standards of the National Section on Girls and Women's Sports are followed by the great majority of colleges and, in general, practices and policies in varsity-type competition are similar to those followed in other types of extramural participation.

IN 1943 A SURVEY of competition for women in American colleges and universities was made by the Committee on Competition of the National Association for Physical Education of College Women. This study¹ which gave a picture of the status of intramural and extramural competition indicated that the extramural program was modified or eliminated completely during the wartime period in 61 per cent of the colleges as a result of existing conditions.² In the past few years many questions have been asked about the present status of extramural competition for college women and in 1950 the Committee on Competition³ was reconstituted by the Board of Directors of the National Association for Physical Education of College Women to survey current practices and policies in this area.

The purposes of the study as outlined by the Committee were:

1. To obtain information from a sampling of institutions throughout the United States concerning present practices and policies in extramural competition;
2. To obtain information concerning the nature and extent of extramural participation in physical education activities of a non-competitive nature;
3. To determine where and if problems exist and to make recommendations to the NAPECW;

¹Report of the Committee on Competition of the National Association of Physical Education for College Women, Competition for Women in American Colleges and Universities, *Research Quarterly*, 16, 49-71, March 1945.

²*Op. cit.*, p. 64.

³Members of the Committee: *Elizabeth Beall*, Wellesley College; *Elizabeth Matson*, College of the Pacific; *Marion Russell*, Purdue University; *Clare Small*, University of Colorado; *Celeste Ulrich*, Madison College; *Christine White*, Wheaton College; *Janet Yeager*, Bryn Mawr College; *Advisory*, *Gladys Scott*, State University of Iowa.

4. To obtain information concerning past or present studies dealing with competition for women and girls.

Procedure

A questionnaire was prepared by the members of the Committee and in a trial form was submitted to 37 colleges, universities, and junior colleges at the NAPECW Workshop in Wisconsin (June 1951) and the secondary School Workshop, Junior College Division, in California (August 1951). The revised form was approved by the Chairman of Research of the NAPECW who served as an advisory member of the Committee.

The following colleges and universities were invited to participate in the survey:

1. All institutions (290) represented in the NAPECW membership.
2. All member institutions of the Athletic Federation of College Women which were not represented in NAPECW membership (152).

The number of colleges in each district of NAPECW was then compared with the total number of institutions of higher education listed in the Directory of the United States Office of Education and it was found that the sampling by districts ranged from slightly less than 20 per cent in the East and South to 33 per cent in the West. To provide a more adequate sampling, 26 non-member colleges in the East and 32 Negro colleges in the South were added. Of the above 500 institutions invited to take part in this study, 352 indicated their interest in participating and were sent questionnaires in October 1951. The replies numbered 230, or 65 per cent: 134 members of both NAPECW and AFCW; 46 of NAPECW only, 40 of AFCW only, and ten members of neither organization. These returns included 62 per cent of the institutions represented in the NAPECW membership and 50 per cent of the member institutions of AFCW.

Analysis of Data

As a means of organizing and interpreting the replies, the following groupings and terms have been used:

1. Districts of NAPECW: Eastern, Southern, Midwestern, Central, Western.
2. Type of College: women's colleges, coeducational colleges.
3. Enrollment: large—1,000 or more women students
medium—500-999 women students
small—499 or less women students.

INSTITUTIONS REPRESENTED BY QUESTIONNAIRES RETURNED

The types of institutions represented are: 129 coeducational colleges and universities, 42 women's colleges, 39 teachers colleges and 20 junior colleges. Inspection of returns shows no great differences in practice among the different types of colleges and therefore the returns have been analyzed on the basis of women's colleges and coeducational colleges, size, and district; this classification also permits comparisons with the 1943 Survey. (See Table 1.)

TABLE 1
Number of Questionnaires Returned by District, Size, and Type of College

| DISTRICT | Women's Colleges | | | | Coeducational Colleges | | | | Total |
|------------------------|------------------|--------|-------|-------|------------------------|--------|-------|-------|-------|
| | Large | Medium | Small | Total | Large | Medium | Small | Total | |
| East..... | 5 | 11 | 15 | 31 | 11 | 8 | 15 | 34 | 65 |
| South..... | 4 | 5 | 7 | 16 | 7 | 11 | 8 | 26 | 42 |
| Midwest..... | | 1 | 4 | 5 | 12 | 14 | 21 | 47 | 52 |
| Central..... | | 1 | 1 | 2 | 7 | 12 | 11 | 30 | 32 |
| West..... | | | 1 | 1 | 13 | 9 | 16 | 38 | 39 |
| Total 1951..... | 9 | 18 | 28 | 55 | 50 | 54 | 71 | 175 | 230 |
| Total 1943 survey..... | 11 | 16 | 33 | 60 | 39 | 39 | 89 | 167 | 227 |

TEACHING STAFF (See Table 2, p. 347.)

The percentage of institutions having only professionally trained⁴ women (i.e., there are no men teachers or specialists without professional training) in 40 per cent of women's colleges and 58 per cent of coeducational colleges as compared with 57 per cent and 54 per cent in 1943.

The use of specialists without professional training has doubled since 1943 from 23 per cent to 56 per cent in the women's colleges and from 13 per cent to 25 per cent in the coeducational colleges. They are engaged most frequently in teaching riding (28 colleges), golf (21), dance (14), and fencing (10).

The number of men⁵ teaching women's classes in women's colleges is approximately the same, 22 per cent as compared with 20 per cent in 1943. The decrease from 33 per cent in 1943 to 26 per cent in coeducational colleges is probably accounted for by the fact that the teaching of professional courses by men was ruled out in the present study.

Definitions

Intramural participation includes participation in sports and in club and dance groups within an institution but no participants from other schools or organizations. It does not include games played in instructional classes in physical education.

Extramural participation includes participation in play days (in which representatives participate on mixed teams), sports days (in which school teams participate as a unit), demonstration games (between college teams and teams of national or local players), telegraphic meets and meets conducted by mail, symposiums (dance, swimming, etc.), performances and demonstrations by special groups (dance and swimming clubs) or any other events in which students compete or participate with groups other than those from their own institution.

⁴Minimum of B.A. or B.S. in physical education.

⁵Includes specialists and those with professional training.

TABLE 2
Teaching Staff in Women's Physical Education Departments Classified, According to District, Size, and Type of College
Number of Colleges

| Teaching Staff | East | | | South | | | Midwest | | | Central | | | West | | | Total | | | Total | |
|--|------|----|----------------|-------|----|----|---------|----|----|---------|----|----|------|----|----|-------|----|----|-------|----|
| | L | M | S ¹ | L | M | S | L | M | S | L | M | S | L | M | S | L | M | S | No. | % |
| | | | | | | | | | | | | | | | | | | | | |
| Women's Colleges (N)..... | 5 | 11 | 15 | 4 | 5 | 7 | 1 | 4 | | 1 | 1 | | 1 | | | 9 | 18 | 28 | 55 | |
| Professionally trained women only ² | 2 | 3 | 7 | 2 | 3 | 3 | | 2 | | | | | | 4 | 6 | 12 | | | 22 | 40 |
| Specialists ³ | 3 | 7 | 7 | 2 | 2 | 4 | | 1 | 2 | 1 | 1 | | 1 | | | 5 | 11 | 15 | 31 | 56 |
| Men ⁴ | 2 | 3 | 3 | 1 | 1 | | | | | 1 | | | 1 | | | 3 | 5 | 4 | 13 | 24 |
| Coeducational Colleges (N)..... | 11 | 8 | 15 | 7 | 11 | 8 | 12 | 14 | 22 | 7 | 11 | 10 | 13 | 10 | 16 | 50 | 54 | 71 | 175 | |
| Professionally trained women only..... | 4 | 6 | 9 | 5 | 5 | 7 | 6 | 13 | 15 | 4 | 7 | 8 | 4 | 2 | 6 | 23 | 33 | 45 | 101 | 58 |
| Specialists..... | 6 | 2 | 5 | 2 | 2 | | 4 | | 3 | 2 | 2 | 2 | 5 | 4 | 4 | 19 | 10 | 14 | 43 | 25 |
| Men..... | 6 | | | 1 | 4 | | 3 | 1 | 3 | 3 | 3 | | 7 | 4 | 8 | 20 | 12 | 13 | 45 | 26 |
| All Colleges..... | 16 | 19 | 30 | 11 | 16 | 15 | 12 | 15 | 26 | 7 | 12 | 11 | 13 | 10 | 17 | 59 | 72 | 99 | 230 | |
| Professionally trained women only..... | 6 | 9 | 16 | 7 | 8 | 10 | 6 | 13 | 17 | 4 | 7 | 8 | 4 | 2 | 6 | 27 | 39 | 57 | 123 | 58 |
| Specialists..... | 9 | 9 | 12 | 4 | 4 | 4 | 4 | 1 | 5 | 2 | 2 | 3 | 5 | 4 | 5 | 24 | 21 | 29 | 74 | 32 |
| Men..... | 8 | 3 | 5 | 2 | 5 | | 3 | 1 | 3 | 3 | 4 | | 7 | 4 | 9 | 23 | 17 | 17 | 57 | 25 |

¹ L—large; M—medium; S—small.
² At least B.A. or B.S. in physical education.
³ No professional training in physical education (includes men and women).
⁴ Teaching women's classes (professional courses omitted).

Varsity-type competition is a form of extramural competition by teams, groups or clubs which practice as a unit over a period of time and participate in a series of meets, matches or games with similar teams from other institutions. In this report this type of competition will be considered as distinct from the other forms of extramural participation.

Summary of Findings

EXTRAMURAL COMPETITION

1. Number of colleges participating increased from 81 per cent (which included varsity-type) in 1943 to 92 per cent (which does not include varsity type) in 1951. (See Tables 3 and 4.) The rise may be attributed at least in part to the elimination of wartime restrictions, which in 1943 were reported by 61 per cent of the colleges as modifying or completely eliminating extramural competition.

2. Extramural competition is most frequently found in the Eastern District, with 99 per cent of the colleges participating. (See Table 4.)

3. Estimates for the total number of different individuals participating in each college range from 8 to 350, with the mean at 60. Only 14 per cent of the colleges report 100 or more participants.

4. The sports day is by far the most widely used form of extramural competition and has increased in popularity since 1943. Demonstration games have also increased in popularity, while playdays and telegraphic and mail meets have declined. (See Table 4.)

5. Twenty-three sports are found in sports day competition, of which the most popular are: basketball, hockey, volleyball, tennis, softball, swimming, and badminton. Of the 22 sports found in playdays the most popular are: volleyball, basketball, softball, swimming, and badminton. Demonstration games are played most often in hockey, basketball, and volleyball, and telegraphic and mail meets are held in archery, bowling, and swimming. (See Table 5.)

6. In the majority of cases, teams are chosen jointly by staff and students and most frequently on the basis of skill and/or interest.

7. Special practices for these teams are reported by 105 colleges; these are most frequently held in basketball, hockey, volleyball, tennis, softball, and swimming in descending order. The number of practices ranges from 1-19 per sport: one or two in 40 colleges; three to five in 25; six to ten in 13; 11 to 19 in three.

8. Rated⁶ officials are used by a higher percentage of women's colleges (80%) as compared with coeducational colleges (73%). (See Table 6.)

9. The percentage of colleges which always have social events in connection with extramural activities is higher (58%) in women's colleges than in the coeducational colleges (53%).

⁶Term used to designate officials rated by the Women's National Officials Rating Committee of AAHPER's National Section for Girls and Women's Sports and The United States Field Hockey Association.

TABLE 3
Number and Percentage of Colleges Participating in Various Types of Extramural Competition, According to Type and Size of College

| Type of Competition | East | | | South | | | Midwest | | | Central | | | West | | | Total | | | Total | |
|---|------|----|----|-------|----|---|---------|---|---|---------|----|----|------|----|----|-------|----|----|-------|-----|
| | L | M | S | L | M | S | L | M | S | L | M | S | L | M | S | L | M | S | | |
| | | | | | | | | | | | | | | | | | | | | |
| <i>Women's Colleges (N)</i> | 5 | 11 | 15 | 4 | 5 | 7 | | | | 1 | 4 | | 1 | 1 | | 1 | 9 | 18 | 28 | 55 |
| Extramural competition ¹ | 4 | 11 | 15 | 4 | 5 | 5 | | | | | 4 | | 1 | 1 | | 1 | 8 | 17 | 26 | 51 |
| Sports days..... | 4 | 10 | 10 | 4 | 4 | 4 | | | | | 4 | | | | | 1 | 8 | 14 | 20 | 42 |
| Playdays..... | 1 | 2 | 5 | | 1 | 2 | | | | | 1 | | | | | | 1 | 3 | 9 | 13 |
| Demonstration games..... | 3 | 4 | 5 | 2 | 1 | 3 | | | | | 3 | | | 1 | | | 5 | 6 | 12 | 23 |
| Telegraphic and mail meets.. | 4 | 4 | 6 | 3 | 2 | 2 | | | | | 2 | | | 1 | | | 7 | 7 | 11 | 25 |
| <i>Coeducational Colleges (N)</i> | 11 | 8 | 15 | 7 | 11 | 8 | | | | 12 | 14 | 21 | 7 | 11 | 11 | | 50 | 54 | 71 | 175 |
| Extramural competition ¹ | 11 | 8 | 13 | 7 | 10 | 3 | | | | 12 | 14 | 19 | 7 | 11 | 9 | | 49 | 52 | 60 | 161 |
| Sports days..... | 8 | 5 | 10 | 6 | 6 | 2 | | | | 12 | 13 | 18 | 5 | 9 | 7 | | 43 | 41 | 52 | 136 |
| Playdays..... | 6 | 4 | 9 | 2 | 5 | 1 | | | | 6 | 5 | 8 | 5 | 6 | 5 | | 3 | 2 | 7 | 22 |
| Demonstration games..... | 4 | 2 | 5 | 3 | 3 | | | | | 4 | 5 | 4 | 2 | 4 | 1 | | 5 | 3 | 5 | 18 |
| Telegraphic and mail meets.. | 7 | 5 | 5 | 4 | 1 | | | | | 10 | 6 | 7 | 5 | 7 | 2 | | 7 | 7 | 21 | 80 |
| | | | | | | | | | | | | | | | | | 33 | 26 | 21 | 46 |

¹ Having extramural competition of any kind.

TABLE 4
Number and Percentage of Colleges Participating in Various Types of Extramural Competition, According to District

| Type of Competition | East (N-65) | | South (N-42) | | Midwest (N-52) | | Central (N-32) | | West (N-39) | | Total No. | Per Cent | |
|---|----------------|----|-----------------|----|-------------------|----|-------------------|----|----------------|----|--------------|----------|------|
| | | | | | | | | | | | | 1951 | 1943 |
| | N | % | N | % | N | % | N | % | N | % | | | |
| Extramural competition ¹ | 62 | 99 | 34 | 81 | 49 | 94 | 30 | 94 | 37 | 95 | 212 | 92 | 81 |
| Sports days. | 47 | 72 | 26 | 62 | 47 | 90 | 22 | 69 | 36 | 92 | 178 | 77 | 49 |
| Playdays..... | 27 | 42 | 11 | 26 | 20 | 38 | 17 | 55 | 12 | 30 | 82 | 36 | 49 |
| Demonstration games. | 23 | 35 | 12 | 29 | 16 | 31 | 8 | 26 | 14 | 35 | 73 | 32 | 26 |
| Telegraphic and mail meets. | 31 | 48 | 12 | 29 | 25 | 48 | 16 | 50 | 21 | 55 | 105 | 46 | 48 |

¹ Having extramural competition of any kind.

TABLE 5

Number of Colleges Having Extramural and Varsity-Type Competition in Various Sports

| Sports | Extramural Competition | | | | Varsity-Type Competition ¹ |
|-------------------------|------------------------|-----------|---------------------|----------------------------|---------------------------------------|
| | Sports Days | Play Days | Demonstration Games | Telegraphic and Mail Meets | |
| | N-178 | N-82 | N-73 | N-105 | N-64 |
| Archery..... | 43 | 11 | | 67 | 10 |
| Badminton..... | 64 | 22 | 8 | | 9 |
| Basketball..... | 144 | 34 | 41 | | 38 |
| Bowling..... | 22 | 4 | 1 | 35 | 6 |
| Fencing..... | 8 | | 3 | | 2 |
| Golf..... | 20 | 1 | 3 | | 2 |
| Hockey..... | 123 | 13 | 34 | | 33 |
| Individual sports..... | 6 | 3 | | | |
| Lacrosse..... | 4 | 1 | 4 | | 6 |
| Riding..... | 10 | 3 | | | 4 |
| Riflery..... | 1 | | | 18 | 6 |
| Sailing..... | 1 | | | | |
| Skiing..... | 9 | | | | 7 |
| Soccer..... | 3 | | | | |
| Softball..... | 71 | 23 | 3 | | 17 |
| Speedball..... | 4 | | | | 1 |
| Swimming..... | 70 | 23 | 4 | 24 | 16 |
| Squash..... | | | 2 | | |
| Tennis..... | 99 | 13 | 8 | | 32 |
| Table tennis..... | 13 | 8 | | | |
| Volleyball..... | 100 | 47 | 15 | | 9 |
| Shuffleboard..... | 3 | 2 | | | |
| Paddle tennis..... | 1 | | | | |
| Basketball throw..... | | | | 1 | |
| Billiards..... | | | | 1 | |
| Deck tennis..... | 1 | | | 1 | |
| Games..... | | 1 | | | |
| General..... | | 2 | | | |
| Nebraska ball..... | | 1 | | | |
| Recreational games..... | | 6 | | | |
| Relays..... | | 1 | | | |
| Spring sports..... | | 2 | | | |
| Track..... | | 1 | | | |

¹ Included here for purposes of comparison.

EXTRAMURAL ACTIVITIES OF A NON-COMPETITIVE NATURE

1. Symposiums and performances and/or demonstrations in modern dance, synchronized swimming, and square dance are the most frequent forms of non-competitive extramural participation. (See Table 8.) The most popular activity is modern dance, with 44 per cent of the colleges taking part in symposiums and 37 per cent in performances or demonstrations. In a small number of instances, symposiums are held in riding, archery, folk dance, and gymnastics, and performances or demonstrations in fencing, tumbling, stunts, riding, tennis, and golf.

TABLE 6
Number of Colleges Using Rated¹ and Non-Rated Women Officials in Extramural Competition, According to Type of College and District

| Classification | Rated Officials | | Non-Rated Officials | | | | | | | | | | Men Officials | | | | | | | | | | | | | | | | | | |
|-----------------------------|--|-----|---------------------|----|-----|----|------------|--------|------------|----------|--------|----------|---------------|---------|----------|------------|--------|------------|----------|--------|----------|-----------|-----|--------------|--------|---------|--------|----------|------------|----------|--------|
| | Total Number of Colleges Having Extramural Competition | | Number Answering | | Yes | No | Basketball | Hockey | Volleyball | Softball | Tennis | Swimming | Yes | Faculty | Students | Basketball | Hockey | Volleyball | Softball | Tennis | Swimming | Badminton | Yes | Occasionally | Riding | Fencing | Skiing | Softball | Basketball | Swimming | Tennis |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Women's colleges..... | 51 | 44 | 41 | 3 | 34 | 30 | 9 | 9 | 8 | 8 | 32 | 27 | 16 | 8 | 8 | 8 | 7 | 6 | 4 | 6 | 0 | 5 | 4 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| Coeducational colleges..... | 161 | 140 | 118 | 22 | 88 | 59 | 48 | 27 | 18 | 11 | 123 | 105 | 98 | 34 | 40 | 38 | 36 | 32 | 14 | 17 | 11 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| District | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| East..... | 62 | 55 | 48 | 7 | 40 | 33 | 5 | 6 | 1 | 6 | 44 | 38 | 27 | 13 | 15 | 12 | 10 | 8 | 4 | 7 | 2 | 5 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| South..... | 34 | 29 | 27 | 2 | 22 | 12 | 14 | 8 | 10 | 6 | 24 | 17 | 19 | 5 | 9 | 7 | 10 | 5 | 6 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Midwest..... | 49 | 42 | 34 | 8 | 27 | 18 | 18 | 8 | 2 | 3 | 38 | 35 | 28 | 15 | 13 | 17 | 13 | 9 | 3 | 5 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Central..... | 29 | 24 | 20 | 4 | 14 | 10 | 8 | 7 | 2 | 2 | 20 | 19 | 16 | 6 | 6 | 4 | 6 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| West..... | 38 | 34 | 30 | 4 | 19 | 16 | 12 | 7 | 6 | 2 | 29 | 23 | 24 | 3 | 5 | 4 | 7 | 8 | 4 | 4 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| Total..... | 212 | 184 | 159 | 25 | 122 | 89 | 57 | 36 | 26 | 19 | 155 | 132 | 114 | 42 | 48 | 46 | 43 | 38 | 18 | 23 | 11 | 6 | 5 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |

¹ Term used to designate officials rated by the Women's National Officials Rating Committee of NSGWS; or in case of hockey, the United States Field Hockey Association.

TABLE 7
Number and Percentage of Colleges Having Extramural Competition With Men, According to District and Type of College

| *Type of Competition | District | | | | | Total | % |
|---------------------------------------|----------|-------|----------|---------|------|-------|----|
| | East | South | Mid-west | Central | West | | |
| <i>Mixed Teams (Men and Women)</i> .. | 19 | 5 | 14 | 8 | 9 | 55 | 24 |
| Women's colleges..... | 9 | 3 | 1 | | | 13 | 23 |
| Coeducational colleges..... | 10 | 2 | 13 | 8 | 9 | 42 | 24 |
| <i>Women's Teams vs Men's</i> | 8 | | 5 | | 2 | 15 | 7 |
| Women's colleges..... | 6 | | | | | 6 | 11 |
| Coeducational colleges..... | 2 | | 5 | | 2 | 9 | 5 |

2. Participation in sports clinics is reported most frequently as follows: basketball in 30 colleges; volleyball and riding, 5; hockey, 4; tennis and softball, 2. In most cases participation includes one or two clinics per sport; practices range from none to ten and there are usually two or less. (See Table 9.)

3. In 34 colleges, outing clubs participate with groups from other colleges and 14 colleges indicate noncompetitive participation with other ski clubs.

VARSITY-TYPE COMPETITION

1. Twenty-eight per cent of the colleges report participation in varsity-type competition. (See Table 10.) In considering the increase shown in this type of competition since 1943, the following should be borne in mind:

(a) The 1943 Survey was conducted during war-time when transportation was restricted; off-campus sports activities were curtailed and 19 per cent of the colleges reported that they were eliminated completely. Therefore, the participation of 36 colleges or 16 per cent may represent an abnormally low figure for varsity competition in 1943.

(b) The questionnaire on which the 1943 returns were based did not define "varsity" competition. The 1951 questionnaire defined "varsity-type" competition explicitly and in such a manner as to include teams and programs which might not be considered "varsity" in the ordinarily accepted sense of the term. Included in the figures in Table 10 are: seven colleges with varsity-type competition in one sport in which they participate in one game or tournament and hold few or no special practices; two colleges with competition in several sports in which one game is played and few practices are held; one college with competition in one sport in which there are two practices and several games.

2. Thirty-one per cent of the women's colleges and 27 per cent of the coeducational colleges participate in this type of competition. (See Table 10.)

3. Forty-eight per cent of all colleges which have this type of competition are located in the Eastern District.

TABLE 8
Number and Percentage of Colleges Having Symposiums, Performances, and Demonstrations Outside of College, According to Type and District

| Classification | Total Number of Colleges | Symposiums | | | | | | Performances and Demonstrations | | | | | |
|------------------------|--------------------------|--------------|----|--------------|----|-----------------------|----|---------------------------------|----|--------------|----|-----------------------|----|
| | | Modern Dance | | Square Dance | | Synchronized Swimming | | Modern Dance | | Square Dance | | Synchronized Swimming | |
| | | N | % | N | % | N | % | N | % | N | % | N | % |
| <i>Type of College</i> | | | | | | | | | | | | | |
| All Women's..... | 55 | 29 | 53 | 7 | 13 | 17 | 31 | 23 | 42 | 3 | 5 | 14 | 25 |
| All coed..... | 175 | 73 | 42 | 34 | 19 | 49 | 28 | 61 | 35 | 42 | 24 | 37 | 21 |
| All small..... | 99 | 24 | 24 | 16 | 16 | 21 | 21 | 17 | 17 | 15 | 15 | 15 | 15 |
| All medium..... | 72 | 35 | 49 | 10 | 14 | 17 | 24 | 24 | 33 | 16 | 22 | 11 | 15 |
| All large..... | 59 | 43 | 73 | 15 | 25 | 28 | 47 | 37 | 63 | 14 | 24 | 25 | 42 |
| <i>District</i> | | | | | | | | | | | | | |
| East..... | 65 | 32 | 49 | 6 | 9 | 25 | 38 | 27 | 41 | 6 | 9 | 17 | 26 |
| South..... | 42 | 17 | 40 | 8 | 19 | 10 | 24 | 14 | 33 | 8 | 19 | 10 | 24 |
| Midwest..... | 52 | 20 | 38 | 11 | 20 | 10 | 19 | 15 | 29 | 9 | 17 | 6 | 12 |
| Central..... | 32 | 14 | 44 | 7 | 22 | 10 | 31 | 13 | 41 | 10 | 31 | 11 | 34 |
| West..... | 39 | 19 | 49 | 9 | 23 | 11 | 28 | 15 | 38 | 12 | 31 | 7 | 18 |
| Total..... | 230 | 102 | 44 | 41 | 18 | 67 | 25 | 84 | 37 | 45 | 20 | 51 | 22 |

TABLE 9

Number of Colleges Attending Symposiums and Giving Outside Performances and Demonstrations, Classified According to Number Attended and Special Practices Held

| Classification | Symposia | | | Performances and Demonstrations | | |
|---------------------------------|--------------------------|-------------------------|----------------------------|---------------------------------|-------------------------|----------------------------|
| | Modern Dance N-102 | Square Dance N-41 | Synch. Swimming N-66 | Modern Dance N-84 | Square Dance N-45 | Synch. Swimming N-51 |
| <i>Number Attended</i> | | | | | | |
| 2 or less..... | 82 | 24 | 54 | 48 | 24 | 41 |
| 3-5..... | 13 | 8 | 8 | 24 | 9 | 6 |
| 6-10..... | 2 | 1 | | 6 | 3 | |
| 11-20..... | 1 | 1 | | 1 | | |
| <i>No. of Special Practices</i> | | | | | | |
| None..... | 34 | 14 | 10 | 12 | 7 | 10 |
| 2 or less..... | 6 | 4 | 6 | 5 | 6 | 4 |
| 3-5..... | 16 | 4 | 10 | 10 | 10 | 8 |
| 6-10..... | 7 | 6 | 10 | 10 | 7 | 8 |
| 11-20..... | 5 | 1 | 9 | 6 | 1 | 2 |
| 21-30..... | 1 | | 2 | 1 | | 3 |
| "Extensive"..... | 3 | | 3 | 2 | | 1 |

4. Thirty-nine per cent of the 64 colleges participate in only one sport and 9 per cent in two. (See Table 11.)

5. The more extensive programs are found in the Eastern District. The greatest number of games and practices are in basketball. (See Tables 11 and 12.)

6. Sixteen sports are listed. The most popular are: basketball, hockey, tennis, softball, and swimming. (See Table 5.)

7. Seventeen per cent (11) of these colleges have men coaches in the following sports: riflery, fencing, skiing, golf, and basketball.

8. The number of students participating ranges from four to 200, with the mean at 52.9 students per college. Twenty-three colleges report more than 50 participants and five report more than 100. Students who play on varsity-type teams also participate in intramural competition in 38 of the 64 colleges.

9. Comparison of the percentage of students participating in intramurals in colleges with varsity-type competition with colleges which do not follow this practice shows means of 43 per cent participation in both cases. A comparison of the medians shows 32 per cent participation in colleges with varsity-type competition and 48 per cent in other colleges.

10. Forty-one colleges report total hours of staff time per year spent in coaching varsity-type teams as four to 600 hours; the mean for this is 116 hours. In comparison 39 report a range of 18 to 630 hours spent in the intramural program, the mean of which is 214.5 hours.

11. The coaching, health, and safety of players on varsity-type teams are under the supervision of the physical education department in 43 colleges; in

TABLE 10
Number and Percentage of Colleges Having Varsity-Type Competition, According to Type and District

| District | Women's Colleges (N-55) | | | | | Coeducational Colleges (N-175) | | | | | 1951 | | 1943 | |
|--------------|----------------------------|---|---|-------|----|-----------------------------------|----|----|-------|----|-------------------|----|-------------------|----|
| | L | M | S | Total | % | L | M | S | Total | % | Total % (N-64) | | Total % (N-36) | |
| | | | | | | | | | | | | | | |
| East..... | | 7 | 7 | 14 | 45 | 7 | 4 | 6 | 17 | 50 | 31 | 48 | 20 | 32 |
| South..... | 1 | 1 | | 2 | 13 | 1 | 1 | 2 | 4 | 15 | 6 | 14 | 2 | 6 |
| Midwest..... | | | 1 | 1 | 20 | 2 | 1 | 10 | 13 | 27 | 14 | 27 | 9 | 17 |
| Central..... | | | | | | | 3 | | 3 | 10 | 3 | 9 | 4 | 9 |
| West..... | | | | | | 4 | 2 | 4 | 10 | 26 | 10 | 26 | 1 | 3 |
| Total..... | 1 | 8 | 8 | 17 | 31 | 14 | 11 | 22 | 47 | 27 | 64 | 28 | 36 | 16 |

TABLE 11

Number and Percentage of Colleges Having Varsity-Type Competition, Classified According to District and the Number of Sports in Which They Participate

| Number of Sports | East N-31 | South N-6 | Midwest N-14 | Central N-3 | West N-10 | Total N-64 | % |
|------------------|--------------|--------------|-----------------|----------------|--------------|---------------|----|
| 1..... | 6 | 2 | 8 | | 9 | 25 | 39 |
| 2..... | 3 | 1 | 1 | 1 | | 6 | 9 |
| 3..... | 2 | 1 | 2 | | 1 | 6 | 9 |
| 4..... | 1 | 1 | | 2 | | 4 | 6 |
| 5..... | 4 | 1 | 2 | | | 7 | 11 |
| 6..... | 3 | | | | | 3 | 5 |
| 7..... | 7 | | | | | 7 | 11 |
| 8..... | 1 | | 1 | | | 2 | 3 |
| 9..... | | | | | | | |
| 10..... | | | | | | | |
| 11..... | 1 | | | | | 1 | 2 |
| 12..... | 1 | | | | | 1 | 2 |
| No report..... | 2 | | | | | 2 | 3 |

TABLE 12

Number of Games or Meets and Practices in the Five Most Popular Varsity-Type Sports

| Sports | Games or Meets | | Practices Per Week | | Practices Per Season | |
|--|----------------|------|--------------------|------|----------------------|------|
| | Range | Mean | Range | Mean | Range | Mean |
| Basketball..... | 1-15 | 6.1 | 1-5 | 2.9 | 1-90 | 19.8 |
| Hockey..... | 1-8 | 4.6 | 1-5 | 2.9 | 1-40 | 13.7 |
| Softball..... | 1-9 | 4.4 | 1-5 | 2.7 | 1-24 | 11.2 |
| Swimming..... | 1-9 | 3.1 | 1-4 | 2.7 | 3-34 | 16.6 |
| Tennis..... | 1-10 | 3.6 | 1-6 | 3.2 | 1-50 | 21.2 |
| All sports combined ¹ | 1-15 | 4.8 | 0-6 | 2.8 | 1-90 | 16.4 |

¹ Includes the 16 sports found in varsity-type competition.

13 cases they are under the supervision of the physical education department and the athletic association jointly. Others mentioned are the health service (5) and the athletic association (2).

12. Teams are chosen by faculty and students jointly in the majority of colleges and chiefly on the basis of skill.

13. The majority report that this type of competition has no adverse effect on their intramural and physical education programs and 50 per cent or more believe that it stimulates interest. The undesirable effects listed are the restriction of facilities, time, and staff for intramurals. (See Table 14.)

COMPARISON OF EXTRAMURAL⁷ AND VARSITY-TYPE PROGRAMS

1. Social values and the opportunity for skilled players are the desirable outcomes of the extramural program most frequently mentioned; the same values are most frequently listed (in a smaller percentage of cases) by the colleges which have varsity-type competition. (See Table 17.) There are no

⁷Includes competitive and non-competitive activities.

TABLE 13
Number of Colleges Having Varsity-Type Competition, Classified According to Various Sports

| Classification | Total Number of Colleges | Number Having Varsity-Type Competition | Sports Included | | | | | | | | | | | | | | | |
|------------------------|--------------------------|--|-----------------|-----------|------------|---------|---------|------|--------|----------|--------|---------|---------|----------|-----------|----------|--------|------------|
| | | | Archery | Badminton | Basketball | Bowling | Fencing | Golf | Hockey | Lacrosse | Riding | Riflery | Skating | Softball | Speedball | Swimming | Tennis | Volleyball |
| Type of College | | | | | | | | | | | | | | | | | | |
| All women's..... | 55 | 17 | 3 | 6 | 14 | 3 | 1 | 0 | 15 | 5 | 3 | 1 | 0 | 7 | 1 | 8 | 10 | 2 |
| All coeducational..... | 175 | 47 | 7 | 3 | 24 | 3 | 6 | 2 | 18 | 1 | 1 | 5 | 7 | 10 | 0 | 8 | 22 | 7 |
| All small..... | 99 | 30 | 1 | 2 | 18 | 0 | 0 | 0 | 12 | 2 | 0 | 1 | 1 | 6 | 0 | 7 | 15 | 3 |
| All medium..... | 72 | 19 | 3 | 5 | 11 | 4 | 2 | 0 | 12 | 3 | 3 | 1 | 3 | 7 | 1 | 5 | 9 | 2 |
| All large..... | 59 | 15 | 6 | 2 | 9 | 2 | 5 | 2 | 9 | 1 | 1 | 4 | 3 | 4 | 0 | 5 | 8 | 3 |
| District | | | | | | | | | | | | | | | | | | |
| East..... | 65 | 31 | 8 | 9 | 25 | 6 | 3 | | 19 | 6 | 3 | 4 | 3 | 13 | 1 | 11 | 16 | 5 |
| South..... | 42 | 6 | 1 | | 5 | | 2 | | 4 | | | 0 | | | | 1 | 3 | |
| Midwest..... | 52 | 14 | | | 6 | | 2 | 1 | 7 | 1 | 1 | 1 | | 2 | | 2 | 9 | 2 |
| Central..... | 32 | 3 | | | 1 | | | | 2 | | | 1 | 1 | 2 | | 1 | 1 | 2 |
| West..... | 39 | 10 | 1 | | 1 | | | 1 | 1 | | | | 3 | | | 1 | 4 | |
| Total..... | 230 | 64 | 10 | 9 | 38 | 6 | 7 | 2 | 33 | 6 | 4 | 6 | 7 | 17 | 1 | 16 | 32 | 9 |

TABLE 14
Opinions Concerning the Effect of Varsity-Type Competition on Intramural and Physical Education Programs

| Effect | Women's Colleges N-17 | | Coeducational Colleges N-47 | | Total N-64 | | | |
|---------------------------------|--------------------------|-----------------------|-----------------------------------|-----------------------|-----------------|----|-----------------------|----|
| | Intra- Mural | Physical Education | Intra- Mural | Physical Education | Intra- Mural | | Physical Education | |
| | | | | | N | % | N | % |
| None..... | 5 | 6 | 9 | 11 | 14 | 23 | 17 | 27 |
| Stimulates interest..... | 11 | 8 | 30 | 24 | 41 | 64 | 32 | 50 |
| Restricts use of facilities.... | 4 | 0 | 4 | 0 | 8 | 12 | | |
| Reduces time available.... | 2 | 1 | 3 | 1 | 5 | 8 | 2 | 3 |
| Reduces staff..... | 0 | 0 | 3 | 0 | 3 | 5 | | |
| Reduces student time..... | 1 | | | | 1 | 2 | | |
| Discourages some..... | 1 | | | | 1 | 2 | | |

TABLE 15
Number and Percentage of Colleges Using Rated¹ and Non-Rated Officials for Varsity-Type Competition According to Sport

| Sports | No. of Colleges Playing | Use Rated Officials | | Use Non-Rated Officials | |
|-----------------|----------------------------|---------------------|-----|----------------------------|----|
| | | N | % | N | % |
| Basketball..... | 38 | 33 | 87 | 6 | 16 |
| Hockey..... | 33 | 24 | 73 | 8 | 24 |
| Lacrosse..... | 6 | 3 | 50 | | |
| Softball..... | 17 | 13 | 76 | 5 | 29 |
| Swimming..... | 16 | 14 | 88 | 4 | 25 |
| Tennis..... | 32 | 7 | 22 | 6 | 19 |
| Volleyball..... | 9 | 9 | 100 | 6 | 67 |
| Total..... | 64 | 40 | 63 | 27 | 42 |

¹ Term used to designate officials rated by the Women's National Officials Rating Committee of NSGWS the U. S. Field Hockey Association, and the U. S. Women's LaCrosse Association.

TABLE 16
Number and Percentage of Colleges Reporting Student Requests for More Competition Than is Offered

| Requests Received | Colleges Without Varsity-Type Competition N-166 | | Colleges With Varsity-Type Competition N-64 | | Total N-230 | |
|-------------------|--|----|--|----|----------------|----|
| | N | % | N | % | N | % |
| Frequently..... | 18 | 11 | 9 | 14 | 27 | 12 |
| Occasionally..... | 108 | 65 | 43 | 67 | 151 | 66 |
| Not at all..... | 19 | 12 | 6 | 9 | 25 | 11 |

TABLE 17
Opinions Expressed Concerning Outcomes of Extramural And Varsity-Type Participation

A. DESIRABLE OUTCOMES

| Extramural Participation (N-218) | | | Varsity-Type Competition (N-64) | | |
|--|-----|----------|--|-----|----------|
| | No. | Per Cent | | No. | Per Cent |
| Social values..... | 136 | 62 | Opportunity for skilled.... | 30 | 47 |
| Opportunity for skilled.... | 44 | 20 | Social values..... | 25 | 39 |
| Motivation for athletic association program..... | 28 | 13 | Develop knowledge and skill..... | 9 | 14 |
| Incentive to improve skill.. | 22 | 10 | Educational experience.... | 4 | 6 |
| Recreational experience.... | 18 | 8 | Incentive to highly skilled intramurals..... | 4 | 6 |
| Opportunity to see other colleges..... | 15 | 7 | Opportunity to see other colleges..... | 3 | 5 |
| Educational experience.... | 13 | 6 | Personal growth..... | 4 | 5 |
| Group experience..... | 13 | 6 | | | |
| Friendly competition..... | 11 | 5 | | | |
| Develops appreciation of skilled play..... | 7 | | | | |
| Satisfies desire to play other colleges..... | 6 | | | | |

B. UNDESIRABLE FEATURES

| Extramural Participation (N-218) | | | Varsity-Type Competition (N-64) | | |
|---|-----|----------|---|-----|----------|
| | No. | Per Cent | | No. | Per Cent |
| None stated..... | 45 | 21 | None stated..... | 10 | 16 |
| None..... | 87 | 40 | None..... | 15 | 23 |
| Demand on staff and/or student time..... | 14 | 6 | Demand on staff and/or student time..... | 8 | 13 |
| Expense..... | 11 | 5 | Limited no. of participants.. | 7 | 11 |
| Problems of organization (scheduling, playing time, no. of participants)..... | 9 | 4 | Too intense competition... | 5 | 8 |
| Distance travelled..... | 5 | 2 | Restricts staff and facilities for intramurals..... | 4 | 6 |
| Limited no. of participants.. | 5 | 2 | Problems of organization (scheduling, supervision, selection of players)..... | 4 | 6 |
| Overemphasis on winning.. | 3 | 1 | | | |

undesirable outcomes in extramural participation and none in varsity-type competition in the experience of 61 per cent and 39 per cent of these colleges respectively. The undesirable feature most frequently mentioned by both groups is the demand on staff and/or student time.

2. Policies dealing with the extramural program are most frequently determined by the physical education department and the athletic association jointly. The administration is more frequently concerned in women's than in the coeducational colleges. In colleges with varsity-type competition, policies

are most frequently determined by the physical education department. (See Table 18.)

3. Students appear to be satisfied with the amount of competition now offered in the colleges. Frequent requests for more competition than is offered are reported by only 11 per cent of the colleges which do not have varsity-type competition and by 14 per cent of those with varsity-type competition. (See Table 16.)

4. NSGWS Standards⁸ are followed by the great majority of colleges. However, some of the practices reported seem to be at variance with NSGWS Standards; this occurs in only a small number of cases and chiefly in varsity-type competition.

5. Practices in the conduct of extramural participation (competitive and non-competitive) and varsity-type competition are similar in the following respects:

(a) The physical condition of participants is checked in the great majority of cases; only 13 colleges indicate no check and this is in extramural participation;

(b) The percentage of colleges which do not use rated officials at any time is approximately the same in extramural (12%) and varsity-type competition (13%). (See Tables 6 and 15.);

(c) Men officials are used by 8 per cent for extramural and by 11 per cent for varsity-type competition; in both they are used for riding, fencing, skiing and tennis; for riflery in varsity-type and for softball, basketball and swimming in extramural. (See Table 6.);

(d) Admission is seldom charged;

(e) There is little difference in the means for the greatest distance traveled (136 miles for extramural and 131 for varsity-type); however, a higher percentage of colleges with varsity-type competition make trips in excess of 300 miles each way.

(f) Transportation is provided most frequently by private cars and in descending order by college bus or car, chartered bus, and public bus; the arrangements for transportation are not a student responsibility in the majority of cases;

(g) Forty-five per cent or more of the colleges do not carry special accident insurance; however, adequate coverage by individuals who drive private cars may be a factor;

(h) All trips are chaperoned by a faculty member with few exceptions;

(i) Overnight trips are taken by slightly more than one-third of both groups; the accommodations used chiefly are college dormitories and hotels or motels.

6. The chief differences in the conduct of extramural participation and varsity-type competition are as follows:

⁸National Section for Girls and Women's Sports of the AAHPER, *Standards in Sports for Girls and Women*, rev. 1953.

TABLE 18
Groups Which Determine Policies Relating To Extramural and Varsity-Type Competition

| Groups Determining Policies | Extramural Competition | | | | | | Varsity-Type Competition | | | | | |
|--|------------------------|----|------------------------------|----|-------------|----|--------------------------|----|------------------------------|----|-------------|----|
| | Women's Colleges N-55 | | Coeducational Colleges N-115 | | Total N-230 | | Women's Colleges N-55 | | Coeducational Colleges N-115 | | Total N-230 | |
| | N | % | N | % | N | % | N | % | N | % | N | % |
| Administration..... | 10 | 18 | | | 10 | 4 | 3 | 5 | 3 | 2 | 6 | 3 |
| Physical Education Dept..... | 5 | 9 | 18 | 10 | 23 | 10 | 5 | 9 | 16 | 9 | 21 | 9 |
| Athletic Association..... | | | 12 | 7 | 12 | 5 | | | 2 | 1 | 2 | 8 |
| Physical Education Dept. & Athletic Association..... | 34 | 62 | 106 | 61 | 140 | 61 | 5 | 9 | 22 | 13 | 27 | 12 |
| Administration, Physical Education Dept. & Athletic Association..... | 5 | 9 | 3 | 2 | 8 | 3 | 8 | 14 | 3 | 2 | 11 | 5 |
| Administration & Physical Education Dept..... | 1 | 2 | | | 1 | 4 | 1 | 2 | 3 | 2 | 4 | 2 |
| Administration & Athletic Association..... | | | | | | | | | 1 | 5 | 1 | 4 |
| Others..... | | | 3 | 2 | 3 | | | | 3 | 2 | 3 | |
| Total | | | | | | | | | | | | |
| Administration..... | 16 | 29 | 3 | 2 | 19 | 8 | 12 | 22 | 10 | 6 | 22 | 10 |
| Physical Education Dept..... | 45 | 82 | 127 | 73 | 172 | 75 | 19 | 35 | 44 | 25 | 63 | 27 |
| Athletic Association..... | 39 | 71 | 121 | 69 | 160 | 70 | 13 | 24 | 28 | 16 | 41 | 18 |

(a) The academic standing of students is checked with greater frequency for varsity-type competition (by 70% as compared with 49%);

(b) Students are permitted to miss classes in a higher percentage of colleges with varsity-type competition (56% as compared with 40%);

(c) Rated officials are used by a higher percentage of colleges in extra-mural competition (75% as compared with 63%);

(d) Travel is most frequently financed by the athletic association and/or the participants in extramural participation and in varsity-type competition by the athletic association and/or the physical education department;

(e) The expense of lodging and meals is borne by the participants more frequently in extra-mural participation;

(f) Other expenses (chiefly costume and equipment) are reported in a higher percentage of colleges with varsity-type competition;

(g) Social events are always held by a higher percentage of the colleges in connection with extramural participation.

COMPETITION WITH MEN

1. Approximately one-fourth of the colleges report informal competition on mixed teams in individual sports, volleyball, and softball. Several colleges report basketball, hockey, and "tail" football. Sports considered suitable are: individual sports, volleyball, and softball. (See Table 7.)

2. Varsity teams composed of men and women are reported by seven colleges (6 in East and 1 in South) in tennis, golf, sailing, badminton and archery. Only 18 respondents approve of this type of competition and list badminton, tennis, archery, and golf as suitable sports.

3. Competition by women's teams against men's teams is found most frequently in the Eastern District and in women's colleges. Fifteen colleges report informal competition against men's teams in volleyball, softball, and hockey; basketball and "tail" and touch football are also mentioned. Similar competition by varsity-type teams is reported by five colleges in hockey, basketball, and softball and in a few cases in golf, riflery, tennis, and volleyball. Eighteen per cent of those answering consider that there are no sports suitable for this type of competition; those listed as suitable by 33 to 41 per cent are tennis, volleyball, archery, and badminton.

ACTIVITIES SPONSORED BY NON-COLLEGE GROUPS

1. Sixty-three per cent, or 144 colleges, report that students participate in activities sponsored by non-college groups. Although participation is more frequent during the summer (111 colleges), 101 colleges report participation by students during the academic year.

2. Softball, hockey, tennis, swimming, and basketball are the sports most frequently mentioned as compared with tennis, swimming, golf, softball, and basketball in 1943.

3. The number of participants in any one sport ranges from one to 25 with the mean at 6.4. The highest participation is in hockey, softball, and basketball with means of 11.7, 7.1 and 6.6 participants respectively.

4. Policies for this type of competition are determined by the athletic association and/or the physical education department.

5. In 36 colleges it has been found necessary to regulate this type of activity, as compared with 14 colleges in 1943.

PROBLEMS EXISTING IN COMPETITION

1. Problems in competition are listed more frequently by colleges in the East, Midwest, and South. Opinions expressed indicate a feeling that there is need for study and a definite statement of policies and/or standards in relation to certain specific aspects of competition.

2. The problems most frequently mentioned are listed below:

- (a) United States Field Hockey Association policies relating to competition by college teams and/or student players;
- (b) Touch football for women;
- (c) Existing practices in varsity-type competition;
- (d) Varsity teams composed of men and women;
- (e) Changing emphases and attitudes in sports day competition.

Studies

1. Eighteen colleges report 22 studies dealing with competition for women and girls as completed or in progress.

2. A total of 158 colleges indicate an interest in co-operating in studies in the area of competition for women.

Recreation Education Courses in California Colleges and Universities

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Abstract

In this study, tabulations were made of the number and types of specialized recreation education courses offered by institutions in the State of California. Thirty-six institutions are offering specialized recreation courses; 17 provide a major in recreation, eight, a minor, and 13 offer specialized courses in recreation but have no major or minor field of study. A detailed chart contains the names and frequency range of the courses. Courses offered by California institutions were compared with and were found to agree with certain characteristics described from data assembled in a nation-wide study of 30 institutions.

THE NATIONAL Conferences on Undergraduate (11) and Graduate Study (10) in Health, Physical Education, and Recreation have sharply focused attention on the inadequacies and needs of existing professional leadership education in these three fields. A recent analysis of recreation curricula offered by some 30 colleges and universities throughout the nation also revealed many glaring weaknesses in the recreation preparatory program (5). California, with a rapidly-increasing population and year-round outdoor recreational opportunities, has more recreation personnel in the field than any other state (1). How well are colleges and universities in this state meeting the task of preparing professional recreation personnel?

The Problem

In this study, the investigator has attempted to answer three pertinent questions with their various implications: (a) How many California colleges and universities provide major and minor courses of study in recreation; (b) What specialized recreation education courses are being offered by these institutions; and (c) What are the characteristics of these specialized recreation courses?

Related Studies

The Ohio Study of Recreation Leadership Training (3) made in 1942 devoted one section to an analysis of and recommendations for a recreation curriculum at Ohio State University. At that time, the committee felt there was no need for a separate, highly-specialized curriculum in recreation, since the School of Social Administration as well as the Department of Physical Education already provided curricula for training in this field of specialization. They did suggest the addition of six specific courses to supplement the existing curriculum.

Authorities agree that knowledge and training in general education, psychology, sociology, arts, music, dramatics, and physical education are essential in the development of a professional recreation worker (13). However, the addition of certain specialized courses in recreation is required for proficiency in the field (5, 7). The 29th National Recreation Congress advocated the need for specialized courses apart from the physical education curriculum (12), and a Subcommittee of the California Recreation Commission on Professional Preparation of Recreation Personnel (18) recommended that colleges and universities provide a general background in education and allied fields supplemented by specialized courses to constitute the recreation curriculum. Sorenson writes that . . . "recreation does require a body of specialized knowledge . . ." (17).

Cranford (4) and Miller (8) have made studies on professional preparation in the State of California. Miller outlined a curriculum for major and minor students in recreation at the University of California, Los Angeles, in his study, while Cranford explored the occupational preparation of recreation leaders in state colleges of California.

A subcommittee of the California Recreation Commission has studied the entire problem of professional preparation in the state (18). One section of their publication dealt with courses offered in California institutions; however, no detailed analysis or frequency range of courses given was made.

In his book on leadership, Fitzgerald has described the characteristics of recreation education courses from data assembled in a study of 30 colleges and universities throughout the nation (5). Courses offered by California institutions are compared with these characteristics in the last section of the present study.

Procedure

The latest available catalogues, either 1952-53 or 1953-54, of every four-year private and state college and university in California, as listed in the *Education Directory, Part III, Higher Education* (14), were secured for this exploration. Analysis of the catalogue descriptions of current course offerings specifically entitled recreation or those definitely referring to recreation in the description resulted in the following general headings which were defined and used to classify the specialized recreation courses:

Community Recreation; Recreation Activities and Programs; Field Work in Recreation; Recreation Leadership; Organization and Administration; Theory and Principles; Philosophy and History; Club and Youth Organizations; Recreation Survey; Recreation for the Exceptional; Orientation in Recreation; Methods and Problems in Group Work; Camping and Outdoor Education; Camp Crafts; Camp Leadership; Contemporary Recreation Problems and Trends; Recreation Planning and Methods; Evaluative Procedures; Industrial Recreation; Recreation in Public Education; Community Relations and Resources in Recreation; Field Work in Camping; Hosteling; and Research Methods and Projects.

All courses given in California institutions were categorized and tabulated under these headings. There was some overlapping of courses and difficulty was encountered in determining the content of the course merely by studying its title and description. In many instances a California school offered two or more courses falling into the identical classification.

Camping courses were included as recreation specialization courses, since all the colleges and universities whose curricula were examined required students to take these classes as part of the recreation major.

Certain recreation skills and activities such as dance, team games, individual sports, and other social games acquired in regular physical education classes were not classified as specialized recreation courses. Undoubtedly, many physical education theory courses in philosophy, history, principles, methods, and research offered by the schools under investigation devote part of the semester to a discussion of recreation and are required for recreation majors or minors; however, these were not listed as specialized recreation courses unless there was a specific reference to recreation in either the course title or the description of course content.

No attempt was made in this limited investigation to judge the quality of the contents of the courses, nor was any effort made to evaluate the professional curricula in recreation offered by California colleges and universities.

Findings

Thirty-six institutions in California are offering specialized recreation courses; 13 state and 23 private. Of the 13 state institutions, eight offer a major in recreation, four offer a minor only, and one offers recreation courses not constituting a major or minor; nine private institutions offer a major, four offer a minor only, and 12 provide specialized courses in recreation but have no major or minor field of study. Both the Third Annual California Recreation Conference (2) and the 29th National Recreation Congress (12, p. 80) suggested that colleges and universities should offer specialized recreation courses for students not majoring or minoring in recreation. Thirteen educational institutions in California give specialized recreation courses and have no major or minor in this field.

In schools not providing a recreation major or minor, five give a course (or courses) in Recreation Activities and Programs; four, Community Recreation; four, Organization and Administration; three, Recreation Leadership; two, Camping; two, Club and Youth Organizations; two, Camp Leadership; and one, Theory and Principles. These courses seem general in nature, their main purpose being to acquaint students with the field of recreation and/or to provide knowledge and skills which may be useful in club work, playground work, church groups, or after-school activities.

At the present, the University of California, Los Angeles, is the only school giving a Master's degree for recreation personnel. [Los Angeles State College and San Francisco State College are planning to introduce Master's degree programs in 1953 or 1954 (6).] However, five other schools in the state

offer graduate specialized courses and eight provide experiences in research projects.

San Francisco State College has assumed a leadership role in camping education in California. The college possesses its own camp and offers approximately 30 courses in practical skills and theory as well as actual field experiences in camping.

Table 1 depicts the frequency range of schools offering the specialized courses and the frequency range of courses provided in institutions with majors or minors only. Numbers indicate colleges or universities offering a course (or courses) included in this category; two or more courses in the same classification may be offered by a single institution.

A wide range exists in the number and type of specialized recreation courses being offered by California colleges and universities. Certain basic

TABLE 1
Specialized Recreation Courses Offered by California Institutions

| Course Name | State Institu- tions (13) | Private Institu- tions (23) | TOTAL (36) | State with Major (8) | Private with Major (9) | State with Minor (4) | Private with Minor (4) |
|--------------------------------|------------------------------------|--------------------------------------|---------------|-------------------------------|---------------------------------|-------------------------------|---------------------------------|
| Recreation Activities and | | | | | | | |
| Programs | 8 | 14 | 22 | 5 | 7 | 3 | 2 |
| Community Recreation | 9 | 10 | 19 | 5 | 4 | 3 | 3 |
| Recreation Field Work | 12 | 4 | 16 | 8 | 4 | 4 | 0 |
| Organization and | | | | | | | |
| Administration | 7 | 9 | 16 | 5 | 4 | 2 | 1 |
| Recreation Leadership | 6 | 8 | 14 | 4 | 3 | 3 | 1 |
| Theory and Principles | 6 | 6 | 12 | 4 | 3 | 2 | 2 |
| Camp Leadership | 5 | 7 | 12 | 3 | 4 | 2 | 1 |
| Camping and Outdoor | | | | | | | |
| Education | 5 | 5 | 10 | 3 | 2 | 2 | 1 |
| Research Methods and | | | | | | | |
| Projects | 6 | 4 | 10 | 3 | 4 | 3 | 0 |
| Clubs and Youth Organizations | 5 | 5 | 10 | 3 | 3 | 2 | 0 |
| Recreation Problems and | | | | | | | |
| Trends | 3 | 4 | 7 | 2 | 4 | 1 | 0 |
| Recreation Planning and | | | | | | | |
| Methods | 4 | 2 | 6 | 4 | 2 | 0 | 0 |
| Recreation for the Exceptional | 3 | 2 | 5 | 2 | 2 | 1 | 0 |
| Camp Crafts | 3 | 1 | 4 | 2 | 1 | 1 | 0 |
| Philosophy and History | 3 | 1 | 4 | 3 | 1 | 0 | 0 |
| Orientation in Recreation | 3 | 1 | 4 | 3 | 1 | 0 | 0 |
| Methods and Problems in | | | | | | | |
| Group Work | 3 | 0 | 3 | 3 | 0 | 0 | 0 |
| Recreation Survey | 3 | 0 | 3 | 3 | 0 | 0 | 0 |
| Camping Field Work | 1 | 1 | 2 | 1 | 1 | 0 | 0 |
| Recreation in Public | | | | | | | |
| Education | 2 | 0 | 2 | 2 | 0 | 0 | 0 |
| Community Relations and | | | | | | | |
| Resources | 2 | 0 | 2 | 2 | 0 | 0 | 0 |
| Evaluative Procedures | 2 | 0 | 2 | 2 | 0 | 0 | 0 |
| Industrial Recreation | 1 | 0 | 2 | 1 | 0 | 0 | 0 |
| Hosteling | 0 | 1 | 1 | 0 | 1 | 0 | 0 |

courses—Recreational Activities and Programs, Community Recreation, Field Work in Recreation, Recreation Leadership, Organization and Administration, and Principles and Theory—are taught in approximately half of the institutions providing majors in recreation. Otherwise, there is no uniformity in the course offerings. The choice of courses offered appears to depend upon the individual department's philosophy or motive.

All state colleges or universities with a major or minor in recreation require field work experiences from the students enrolled in their departments. Only four of the private institutions with a major in recreation offer field work, while none offering only a minor gives opportunities for such experience. The state schools, in general, offer a greater number of specialized recreation courses than the private schools. Institutions offering a minor in recreation give only two to four specialized courses, usually omnibus type.

Discussion of Characteristics

The characteristics of the recreation education courses in California colleges and universities agree with certain features described on a nation-wide basis (5). In undeveloped recreation curricula, a common practice is to offer a few omnibus courses in which several important factors are lumped together, each receiving superficial treatment. Favorite titles for courses of this type are "Community Recreation," "Organization and Administration," or something similar (5). Examples of this fault can be found.

A course entitled Community Recreation is taught by 19 of the 36 schools. Of the institutions offering a major in recreation, nine teach such a course; six of the institutions offering a recreation minor provide this course; and three schools with neither a major or a minor in recreation offer the course. In the latter two cases—institutions offering only a minor in recreation or those offering neither a major nor minor—this course is probably designed to give the student an over-all picture of the field. On the other hand, two schools offering a major in recreation have only three and four recreation courses, respectively, one being "Community Recreation." Evidently, this omnibus course covers the whole field and these particular schools must depend on other departments for specialized skills.

Omnibus or general courses can be used, however, to teach basic foundational material in preparation for later, intensive specialized courses. Los Angeles State College, College of the Pacific, San Francisco State College, San Jose State College, Long Beach State College, and several others offer a number of highly-specialized recreation courses in addition to one in Community Recreation or Organization and Administration. Perhaps they offer these omnibus-type courses as a foundation for the more specialized courses.

One college with a national reputation which advertises a major in recreation does not even include one professional theory course in its curriculum; it relies on general education and skill courses from other fields (5). Two state institutions and three private ones in California appear to depend upon other departments for training their recreation personnel, since they offer but two or three specialized courses in recreation.

Authorities (5, 13, 17) suggest a healthy balance between specialized recreation education courses and education in other fields. Most California institutions include general education, electives, and skill offerings from other fields in the required list of subjects for the major or minor in recreation. For example, the University of California, Los Angeles, offering a major in recreation, outlines the following course of study (19):

4. *Major in Recreation.* This major is designed to develop professional leaders in recreation with a sound general education, an insight into the social responsibilities of community agencies, and an understanding of the nature and significance of the group work method in recreation.

Preparation for the Major. Courses in Physical Education, Art, Botany, English, Speech, Music, Psychology and Sociology.

The Major. 36 upper division units in recreation and physical education; and electives from Art, Education, Music, Psychology, Speech, Sociology and Theatre Arts.

Sacramento State College, offering a minor in recreation, reflects a philosophy in keeping with current ideals for personnel preparation (15):

RELATED COURSES IN OTHER FIELDS. Since recreational leadership, supervision and administration require both general and highly specialized competencies which may be acquired through training and experiences in different fields, students preparing for a recreational occupation should round out the minor pattern with other courses. Depending upon the fields of specialization and objectives in recreational leadership, the student, with the aid of his advisor, will find many closely related and directly applicable courses to choose from in such fields as art, life science, education, speech, arts, music, physical education, psychology, sociology, and recreational therapy.

Recreation departments should organize knowledge and skills essential to the profession into specific instructional areas and field work. Courses of this type should be illustrated by such titles as "Social Aspects of Leisure," "Recreation Areas and Facilities," "Recreation Surveys," and "Community Organization for Recreation" (5). Institutions in California which notably follow this ideal are Los Angeles State College; University of California, Los Angeles; Pepperdine College; San Francisco State College; and College of the Pacific, which offer such courses as Program Planning, Administrative Problems in Recreation, Recreation Surveys, Trends in Recreation, Recreation in Public Education, Methods in Group Work, Community Resources for Recreation, etc.

Courses in such skill areas as physical activities, music, arts and crafts may be taught by departments specializing in those fields, but a definite effort should be made to build such courses around the needs of recreation (5). San Jose College has constructed a curriculum reflecting this belief. The Drama Department gives courses in Drama for Recreation Majors and Fundamentals of Recreation Dramatics; the Music Department teaches Recreational Music; the Art Department offers Crafts and Camp Counseling; while the Education Department instructs in Story Telling (16). Mills College not only offers a well-balanced selection of specialized recreation courses but also utilizes courses of other departments to supplement its curriculum. Majors are required to take such courses as Children's Theatre, Stagecraft, and Lighting from the Drama Department; Working with Groups and Commu-

nity Services in the Education Department; and Leathercraft and Photography from the Art Department (9).

Although shortcomings have been found in the quantity and types of courses offered by some California colleges and universities, other institutions appear to offer courses indicative of a mature philosophy of recreation. Fortunately, professional groups in conjunction with the California Recreation Commission have studied the whole problem of the recreation preparatory program in an endeavor to establish curricula for recreation workers and to plan for eventual certification of California recreation personnel.

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12. NATIONAL RECREATION ASSOCIATION, *Proceedings of the 29th National Recreation Congress, 1947*. New York: National Recreation Association, 1947. pp. 78-80.
13. NEUMEYER, MARTIN H., AND ESTHER S. NEUMEYER, *Leisure and Recreation*. New York: A. S. Barnes and Company, 1949. pp. 369-371.
14. OFFICE OF EDUCATION, *Education Directory, Part III, Higher Education*. Washington, D. C.: Federal Security Agency, 1952-1953. pp. 17-27.
15. SACRAMENTO STATE COLLEGE, *Announcement of Courses and General Catalogue, 1952-1953*. pp. 136-137.
16. SAN JOSE STATE COLLEGE, *Announcement of Courses and General Catalogue, 1952-1953*. p. 268.
17. SORENSON, ROY, Professional Maturity, *American Recreation Society Quarterly Bulletin*, 5: 1, pp. 17-19 (May 1953).
18. SUBCOMMITTEE ON PROFESSIONAL PREPARATION OF RECREATION PERSONNEL, *A Prospectus for the Professional Preparation of Recreation Personnel*. Sacramento: California Recreation Commission, June, 1951. pp. 36-44.
19. UNIVERSITY OF CALIFORNIA, LOS ANGELES, *Bulletin, 1952-1953*. pp. 260-261.

(Submitted 9-13-53)

Research Abstracts

Prepared by the Research Abstracts Committee of the National Council of the Research Section, PAUL A. HUNSICKER, Chairman

Biology

39. SHELDON, WILLIAM H. *Atlas of Men*. New York: Harper & Bros., 1954.

trochanteric, posterior leg, medial leg, lateral leg, lateral arm, medial arm, and associates have made available what might be termed the working tools of Constitutional Psychology for everyone—physicians, geneticists, anthropologists, and educators.

Research-minded educators have for years been especially co-operative in the study of human physique, and many of the 46,000 men photographed and measured by Sheldon have been obtained by these educators.

Much of the somatotype research and study of constitutional behavior already pursued in education—chiefly by physicians, physical educators, and psychologists—has been limited to some extent by the absence of a more specific frame of reference to work from. Now, Sheldon has in print on excellent glossy paper and fully documented, specific examples of the diversity of somatotypes.

The Atlas makes available a standard file of somatotype variations, together with the criteria actually employed in somatotyping so that correlative inquiry can be carried out. Somatotype criteria is set forth so that they can be understood and used. Here, a methodological approach is set forth so that the investigator has something definite—a standardized practical tool for research.

The Atlas of Men consists of photographs representing front, side, and rear views of 1,175 men. Here, readily available to research workers, are the examples of 88 known somatotypes with age—height—weight tables and curves for each. Here is a guide and handbook on somatotyping for all concerned with problems of human structure and behavior.

Since human behavior is the chief concern of the educator, and since man's basic structure and behavior seems highly correlated—this Atlas of Men may well be one of the most significant contributions to the classification and understanding of human beings which science has thus far achieved.—*Carl E. Willgoose*.

Physiology

40. BOZLER, EMIL. The role of phosphocreatine and adenosinetriphosphate in muscular contractions. *J. of General Physiology* 37: 63-70 (Sept. 20, 1953).

It is concluded from these results that phosphocreatine is the substrate for the enzymatic activity of the contractile elements and that this activity depends on the presence of bound nucleotide which acts as an energy transfer mechanism.

Phosphocreatine accelerates relaxation which is caused by ATP under certain conditions. In the presence of phosphocreatine even very low concentrations of ATP can produce relaxation. A strong contraction can be produced under these conditions by the addition of Ca ions. These observations support the conclusion that relaxation depends on the rephosphorylation of nucleotide bound by the contractile elements.—*Paul Hunsicker*.

41. GARN, S. M. Fat patterning and fat intercorrelations in the adult male. *Human Biology*, 26: 1, 59-68, (Feb. 1954).

Telereontgenograms were secured on 87 healthy white males ranging from 20-69 years of age. Mean fat thickness ranged from 18.9 mm. (iliac fat) to 2.7 mm. (anterior leg fat). Ranked in descending order of thickness, the fat sequence was iliac, deltoid, trochanteric, posterior leg, medial leg, lateral leg, lateral arm, medial arm, and anterior leg. Fat rankings were closely related to the total amount of fat and to total

¹The Varieties of Human Physique, The Varieties of Temperament, The Varieties of Delinquent Youth.

body weight. Thus, deltoid-iliac-trochanteric rankings were characteristics of leaner men, and iliac-deltoid-trochanteric rankings were more common among fatter men. Inter-correlations ranged from 0.33 to 0.79. Trochanteric and medial leg fat showed highest intercorrelations and correlated well with gross weight, while lateral and posterior leg fat exhibited a greater degree of autonomy. Neither mean thickness nor anatomical location provided a guide to the predictive efficiency of a fat layer.—*D. B. Van Dalen*. 42. KATCHALSKY, A., and S. LIFSON. Muscle as a machine. *Scientific American*, 190: 72-6 (Mar. 1954).

The authors describe the component parts and principles of operation of a mechano-chemical working system which they have at their laboratory, the Weizmann Institute of Science in Rehovoth, Israel.

A thin strip of suitable material can lift a fairly heavy weight and operate reversibly for many cycles. The operation hinges on the contraction and expansion of a synthetic gel immersed in an alternately acidic and basic solution.

Although the decisive experiments for arriving at the correct explanation of muscle contraction are still in the offing this study represents one step closer to the ultimate answer.—*Paul Hunsicker*.

Recreation

43. AMERICAN CAMPING ASSOCIATION. Guide for counselor policies. *Camping Magazine*, 25: 8 (Nov. 1953).

The survey included 153 camps located in New England. Each camp was asked to indicate its general practices relating to the responsibilities and privileges of counselors.

Some of the general practices revealed by the survey are as follows: (1) counselor-camper ratio of one counselor to not more than five campers; (2) counselors are college students or graduates; (3) minimum counselor age of 18 or 19 years; (4) minimum salary of counselors, other than head of waterfront or head counselors, \$50-\$99; and (5) maximum salary of counselors, other than head of waterfront or head counselors, \$200-\$249. Some of the counselor responsibilities indicated by the camps surveyed are as follows: (1) counselors are responsible for a specific cabin group; (2) counselors are present in cabin at bedtime; (3) counselors are with campers during rest hour; (4) counselors check general health of campers; (5) counselors check cleanliness of campers; (6) counselors turn in written reports on campers; and (7) counselors lead or assist in rainy-day programs.

Among the counselor privileges listed by the various camps were the following: (1) counselors have one day off per week, but usually not during the first or last week of the season; (2) days off begin between noon and 2 P.M.—in some camps, after breakfast; and (3) counselors must be back in camp between 11:00 P.M. and 12:30 A.M.—in some camps, the next day.—*Jackson M. Anderson*.

44. AMERICAN RECREATION SOCIETY. On-campus recreation subject of study at UCLA. *Quarterly Bulletin of the American Recreation Society*, 5: 2 (July, 1953).

A questionnaire was sent to Sophomore students of the University of California at Los Angeles in an attempt to determine their needs for and reaction to the on-campus recreation offerings. The findings of the survey were based on the responses received from 1,217 students.

Some conclusions of the study were as follows: (1) On the basis of the percentages found, it appears that the women are slightly more interested in campus leisure offerings than are the men; (2) Commuting time and employment seem to account for the chief differences in amounts of leisure enjoyed; (3) The highest percentage of participation in campus activities is in social living groups; (4) The percentage of participation in University Recreation Association activities is less for those who live in fraternities or sororities than for those who do not belong to a living group or who did not answer the living-group question; (5) The findings relating to participation in the Associated Women Students indicate this organization is serving more sorority than non-sorority women; (6) Athletic events are the most popular of the spectator-type

activities; (7) Women appear to be more interested than men in noon concerts, art exhibits, lectures, campus theatricals, All-U-Sings, and "Recs"; and (8) Relaxation, working with people, professional reasons, and opportunities for service appear to be the chief reasons for participating in leisure activities.—*Jackson M. Anderson.*

45. RECREATION WILL CUT ABSENTEEISM. *Industrial Sports and Recreation*, 14: 11 (Nov.-Dec. 1953).

Lack of sufficient employee recreation in any given plant may be the cause of at least 20 per cent of all absenteeism, according to a recent report issued by the Industrial Health Board of Great Britain. The Board conducted a two-year research into the causes of absenteeism of 3,000 male and female employees in both skilled and unskilled jobs in engineering factories in England. Medical doctors and psychologists aided in the study.

The report definitely linked a substantial percentage of absenteeism to "lack of recreation interests and proper social relationships." Some of the findings of the study were as follows: (1) Clearly emotional illness is an important cause of industrial disability among employees; (2) The most frequent cause of emotional illness is lack of satisfactory relationships; and (3) Those whose leisure time was spent alone and those with few recreational or leisure-time interests suffered from a higher degree of emotional illness and had a higher rate of absenteeism than the average.—*Jackson M. Anderson.*

Tests and Measurements

46. ANDERSON, K. E., R. T. GRAY, AND E. V. KULLSTEDT. Tables for transmutation of orders of merit into units of amount or scores. *J. of Exp. Educ.* 22: 247-55 (Mar. 1954).

This article consists of a list of tables adapted from C. L. Hull in 1922 to change orders of merit, or "ranks," into normalized scores.—*D. B. Van Dalen.*

47. DURNALL, E. J. JR. Falsification of interest patterns on the kuder preference record. *J. Educ. Psych.* 45: 240-43 (Apr. 1954).

Kuder Preference Record Form BB was administered to 79 men students using instructions furnished by author. The inventory was repeated within one week, with specific instructions to the students to check the items as they believed a person with interest in a certain occupational field would check them. The findings suggest that it is entirely possible to falsify an entire interest pattern on the above test.

The ability to do this is related to a students I.Q. and interest in the field.—*D. B. Van Dalen.*

48. HOLLANDER, EDWIN P. Studies of leadership among naval aviation cadets. *J. of Aviation Medicine*, 25: 164-70 (Apr. 1954).

The study notes that the formal leader should have informal leadership status as well. It further shows how the peer nomination technique may be utilized as a vehicle for identifying informal leaders within cadet groups. Some validity evidence of this technique is advanced.—*Paul Hunsicker.*

49. LIETZKE, M. H. An analytical study of world and olympic racing records. *Science* 119: 333-36 (Mar. 12, 1954).

The article is a mathematical analysis of various racing records. An "exhaustion constant" is advanced for different types of racing.

On the basis of rate curves plotted for various types of racing it is possible to predict what records are out of line when compared to the best efforts in these events. In fact it is possible to calculate by how much they can be improved to bring them in line with the best efforts to date.—*Paul Hunsicker.*

Miscellaneous

50. COMMITTEE ON ECONOMIC STATUS OF THE PROFESSION OF THE AMERICAN ASSOCIATION OF UNIVERSITY PROFESSORS. Instructional salaries in 41 selected colleges and universities for the academic year 1953-54. *AAUP Bulletin*, (Winter 1953-54).

The institutions selected for study were not determined by any random sampling technique but were chosen, with consideration for regional representation, from those which

the Committee had reason to believe followed good practices with respect to instructional salaries and related matters.

The most striking conclusion evidenced by the comparison of all the salary data now collected by the Committee is that instructional salaries have not, since 1939-40, kept pace with living costs, with improvement in the incomes of other professions, or with the per capita growth of the national income.—*Paul Hunsicker.*

51. LESSING, LAWRENCE P. The national science foundation takes stock. *Scientific American* 190: 29-33 (Mar. 1954).

The Foundation's active life dates from the 1951 appointment of Alan T. Waterman, former physics teacher at Yale University, as its director.

The NSF has four main functional areas: fact-finding, granting of funds for basic research and fellowships, dissemination of information and, most important, advising the President and Congress on matters of scientific import.

The Foundation now has four major divisions: the biological sciences, including medical research; the mathematical, physical, and engineering sciences; scientific personnel and education; and program analysis, or fact finding.—*Paul Hunsicker.*

Announcing a New Section

AT OUR READERS' REQUEST—

A new section is being added to the *Research Quarterly*, beginning in December. In the recent readers survey conducted by the Past-Chairman of the Research Council, Dr. Carolyn Bookwalter, reader interest led to establishment of the new section, which will be called

NOTES AND COMMENTS.

Editorial policies of the section will be based on the response to the survey. It will contain notes on minor research and on apparatus, *objective* critical comments, and summaries of status surveys. Readers should note that simple status surveys are no longer acceptable as regular *Quarterly* articles, by decision of the Research Council. Such studies will therefore be published in brief form (from 300 to 500 words) under **NOTES AND COMMENTS** rather than as *Quarterly* articles.

Material submitted for the new **NOTES AND COMMENTS** section should be addressed to the *Research Quarterly* Editor, AAHPER, 1201 Sixteenth St., N.W., Washington 6, D. C. It will be subject to review as in the case of *Quarterly* articles.

Guide to Authors

IN LINE WITH the over-all goal of making Association publications yield the greatest value to the individual and the profession, the following is a guide for the preparation of research manuscripts. The information below recognizes general techniques being employed by research publications similar to the *Research Quarterly*. When copy is prepared in accordance with these instructions, all Association research studies will follow a standard style.

Manuscripts

Manuscripts should be sent to the Editor (AAHPER, 1201 Sixteenth Street, Northwest, Washington 6, D. C., who will see that each one is read by at least three members of the *Research Quarterly* Board of Associate Editors. On the basis of the three reviews, the Editor will advise the author as to the suitability of the paper or the desirability for revision. Papers are not judged by arbitrary standards but on their content of new research results in the field of physical education, health education, and recreation, presented with the greatest brevity compatible with scientific accuracy and clarity (see October 1951 *Quarterly*, pp. 392-4).

Since three members of the Board of Associate Editors review an article, it is requested that three clear copies of the manuscript be submitted in order to facilitate reviewing. A fourth copy of the article should be retained by the author. If only one copy of any charts, photographs, drawings, graphs, or similar illustrative material is submitted, considerably more time must be allowed for review.

Typewritten manuscript should be double-spaced on white paper of ordinary weight and standard size (8½ x 11 inches). A brief abstract of the article, 100 words or less, should be typed double space on a separate sheet. See abstracts at head of *Quarterly* articles for style.

The sheets of manuscript should be kept flat and fastened with clips which can be removed easily. The pages of the typewritten copy should be numbered consecutively in the upper right-hand corner.

Paragraphs should be numbered consecutively throughout the manuscript to facilitate ease of reference in case of revision.

Headings

The article should be arranged so as to indicate relative values of heading and subheadings.

Usually four gradations are sufficient: (a) article title, (b) first subhead appearing in boldface aligned left on page (underscored in manuscript with wavy line) (c) second subhead (if necessary) appearing in small caps aligned left on page, (d) third subhead, to appear in italic (underscored in manuscript), not centered, but run in at the beginning of the paragraph or section.

All headings should be typed in lower case with initial capitals, except for (c) above, which should be typed in capital letters.

FOOTNOTES

Footnotes are not to be used for references or literature citations. They are rather used for the purpose of acknowledgment, special explanation, supplementary information, etc. (*See examples below.*)

Type footnotes (if any) on separate sheets, as many footnotes as convenient being written on a sheet. Footnotes should be numbered from 1 up for each article; a corresponding numeral appearing in the text. Asterisks should not be used.

Examples of Footnotes:

¹This study was made under the direction of Dr. Arthur T. Slater-Hammel in the Research Laboratories, School of Health, Physical Education, and Recreation, Indiana University, Bloomington, Indiana.

²All measurements of the hand were recorded in centimeters and height was recorded in inches. The hand measurements were taken by Everett and reliability coefficients of above .90 were found for each measurement used in the study.

³For their wholehearted co-operation in facilitating collection of the data, special gratitude is extended to Superintendent Clarence Hines and the 1950-51 principals of the Adams, Condon, Edison, Francis Willare, Harris, Howard, Lincoln, River Road, and Whiteaker schools.

Documentation

CITATIONS OF LITERATURE

Citations of literature should be segregated alphabetically by author's last name at the end of each article, under the caption of "REFERENCES." *Do not treat them as footnotes. (See above.)*

The literature citations, listed alphabetically, should be numbered consecutively, their location in the text being indicated by corresponding numbers written in full size and enclosed in parentheses: for example, (1) (2, 3). If there are several references in the text to a citation, the specific pages may be indicated thus: (1, p. 117), (1, pp. 162-3).

A uniform style should be maintained in writing citations. Do not enclose titles of chapters and articles in quotation marks. Italicize (underscore in manuscript) names of books and periodicals, bulletins, etc. (*See examples below.*)

Uniform sequence of data should be observed, as follows: *For a book*—Author's name (last name first); title of article or chapter; name of book; place of publication; publisher; year date. *For a periodical*—Author's name (last name first); title of article or chapter; name of periodical; volume number; inclusive page numbers; year date.

Examples of References Appearing at End of Article:

1. AMERICAN ASSOCIATION FOR HEALTH, PHYSICAL EDUCATION, AND RECREATION. Suggested platforms for health education. *Journal of the American Association for Health-Physical Education-Recreation* 18:436 (Sept. 1947).
2. AMERICAN ASSOCIATION OF SCHOOL ADMINISTRATORS. *Health in Schools*. Revised edition. Washington, D. C.: the Association, a department of the National Education Association. pp. 266-7.

3. DEAVER, G. G., Exercise and Heart Disease. *Research Quarterly*, 26: 24-34, 1939.
4. OGDEN, JEAN, AND JESS OGDEN. *Small Communities in Action*. New York: Harper & Brothers, 1946.
5. POTTER, JOHN NICHOLAS. *Physical Fitness of Junior High School Boys*. Unpublished Master's thesis, University of California, Berkeley, 1942.

Tabular Matter

Each table should have a descriptive heading and should be specifically referred to in the text by number, e.g., "Table 10," etc., never as "the above table" or "the following table." Number tables from 1 up for the entire manuscript, using Arabic numerals. Do not duplicate data by giving it in *both* tables and graphs.

Tables should be double-spaced typewritten, like the rest of the material in the manuscript. They should be typed on separate sheets, as the printer will set them on a different machine from the one used for the text matter. If a table continues on a second sheet, it is not necessary to repeat the boxheads, since the printer will repeat from the original boxheads, when necessary.

The word "TABLE" should be written in capital letters, as: "TABLE 1"; the table title should be written in lower case letters with initial capitals, and centered over the table. Tables should be ruled as desired, except that no rules will appear at the extreme right and left edges of the table. No double rules are to be used, unless necessary for clarity.

Well-known statistical formulas should be omitted. Extensive tabular material, raw data, and appendixes should not be printed; the author can mention in a footnote that he will supply such material in mimeographed form on request.

Illustrations

Illustrative material is of two types: pen and ink drawings, which are reproduced by the line engraving process; and photographs, wash drawings, stipple drawings (in short, anything containing shading), which are reproduced by the halftone process.

Line engravings are always treated as text figures and should be so designated. All drawings should be made with India ink, preferably on white bristol board plate, 1 ply or 2 ply, which is sufficiently transparent to permit tracing if back lighting (e.g., a window pane) is used. Avoid graph paper for the reproduction copy, as the printing interferes with proper inking and the paper permits no corrections. Sometimes it is desirable to ink in the principal guide lines so that the curves can be more easily read. Good examples of graphs can be seen in *The Research Quarterly* for October 1953, pages 332 and 366.

Lettering should be plain and large enough to reproduce well when the drawing is reduced to the dimensions of the printed page ($4\frac{1}{8}$ x 7 inches). Most figures can be advantageously drawn for a linear reduction of one-half or one-third. Be sure to draw the lines heavy enough so that they will not be overly thin after reduction. Explanatory lettering should be included within the chart. Typewritten lettering does not reproduce well; it is much better to use a LeRoy or similar lettering device.

Care should be taken not to waste space, as this means greater reduction and a less satisfactory illustration. Often it is possible to combine several curves in one figure and enable the reader to make comparisons.

Halftones are treated as figures and should be so designated. Frequently, several halftones can be grouped to form an attractive full page, in which case they should be numbered consecutively, in Roman numerals. Photographs should be in the form of clear black-and-white prints on glossy paper. Care should be taken to see that they cannot be bent or folded in handling *and paper clips should not be used*. All imperfections are reproduced.

Figures should each be numbered consecutively from I up for the entire manuscript. Use Roman numerals to number figures, and Arabic numerals to number tables. The legends for the illustrations should be typed upon a separate sheet placed at the end of the manuscript. Care should be taken to indicate plainly in the text the exact location of all illustrations and tables.

The Association will assume complete engraving expense.

Special Points of Style

USE OF NUMBERS

Use Arabic figures for all definite weights, measurements, percentages, and degrees of temperature (for example: 2 kgm., 1 inch, 20.5 cc., 300° C.). Spell out all indefinite and approximate periods of time (for example: over one hundred years ago, about two-and-one-half hours). For numerals used in a general sense, spell out numbers through ten and use Arabic figures for 11 and over (seven times, five years old, 11 students).

ABBREVIATIONS AND SYMBOLS

Standard abbreviations should be used whenever the weights and measurements are used with figures, i.e., 10 kg., 6.25 cc., etc. The forms to be used (for both singular and plural) are: ft., ft.-lb., ft./sec, in., yd., min., hr., sq. ft., sq. in., rpm. *Gram* should be spelled out in all cases to avoid possible confusion with *grain*; also spell out *mile*. All obscure and ambiguous abbreviations should be avoided. Symbols used should follow the notation listed in *Research Methods* (AAHPER), pp. 518-20 and 522-25. Most common are:

| | |
|-------------------------------------|---|
| M = mean | r = Pearson correlation |
| Mdn = median | ¹ bis = biserial correlation |
| N = number of individuals | ¹ r ₁ = reliability coefficient |
| n = number of measurements | χ^2 = chi square |
| σ = standard deviation | F = variance ratio |
| σ_M = standard error of mean | t = Student (Fisher) t ratio |

Per cent should be two words. Use per cent sign (%) in tables or when it appears in parentheses in text.

Proofreading

The author will receive his original manuscript and any engraver's proofs with the galley proofs of his article for correction. A reprint order blank will be enclosed for the author's convenience.

Corrected proofs and original manuscripts are to be returned within 48 hours by first-class mail to the Editor, AAHPER, 1201 Sixteenth Street, Northwest, Washington 6, D. C.

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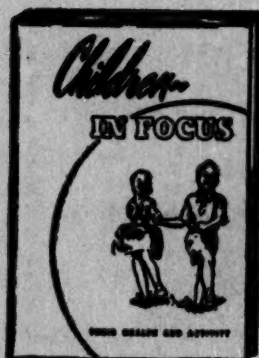
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